

C. Leigh.
78
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LECTURES,

UPON THE

HEART,
LUNGS,
PERICARDIUM,
PLEURA,

ASPERA ARTERIA,
MEMBRANA INTER-
SEPIENS, OR ME-
DIASTINUM.

Together with the DIAPHRAGM,

INTERSPERSED WITH

A Variety of PRACTICAL REMARKS.

By H. MASON, Surgeon.

Nulla enim re magis, quam exemplo docemur.

The above LECTURES were lately delivered at
the SURGEONS THEATRE.



R E A D I N G :

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T O

Mr. GRINDALL,

Senior Surgeon to the *London Hospital,*

A

Member of the Company of
Surgeons of London,

A N D

Fellow of the *Royal Society.*

S I R,

I

Am induced to address
the following LECTURES
to you, from the Know-
ledge I have some Years

had of your Abilities in Surgery ;
as also, from the favourable Cha-

A 2

racter,

iv DEDICATION.

racter, you was pleased to inform me, the late Mr. GIRLE and Mr. NOURSE gave you of them, when they were read at the SURGEONS THEATRE.

I am, with the greatest Sincerity and Respect,

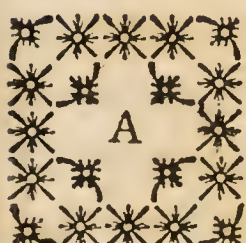
Your most obedient,

Humble Servant,

HENRY MASON.



The Introduction.

 **A**NATOMY, when restricted to Surgery, is that art, which teaches the situation, figure, connexions, fabrick, actions, and uses of the several parts of the human body.

The intent and ends of this science are various: an admiration of one of the noblest works of the creator: a preservation of our health, as nothing can lead us more immediately to a knowledge of the means of preserving it, or restoring it, when impaired by diseases, than a true knowledge of the structure of that frame which is injured by them.

Can a surgeon, who is unacquainted with the human frame, make, for instance, a deep incision into any part of the human body, without running a risque of opening some considerable artery, or wounding some nerve?

Is it not a manifest exposing of the patient to terrible accidents, to bleed him, without knowing the parts adjacent to the vein we are about to open ?

Unless he is well acquainted with the situation of the parts from anatomy, he will be always trembling, either with a vain fear, or else with a rash assurance he will despise the danger of which he is ignorant.

Every chirurgical operation, therefore, proves how indispensably necessary the knowledge of the parts of the human body is to Surgeons ; and that flourishing state of surgery we now see it in, is principally owing to those beautiful discoveries with which anatomy has been lately enriched.

The want of this *index magneticus* (for as the needle is to a mariner, that is anatomy to a Surgeon) will in no instances be more felt by a Surgeon, than in giving his testimony in a court of judicature upon the untimely death of persons he shall be appointed to examine ; and particularly in cases of wounds, for if the part is found to have lost its use after the wound is healed, and as the judge usually inflicts a penalty proportionable to the damage the patient sustains, it is for this reason the council generally

rally use all the art they are masters of to throw most of the ill consequences upon the neglect or mismanagement of the surgeon; therefore the ill effects which naturally follow some wounds, though ever so skillfully treated, should be declared very early, and which can be deduced only from a knowledge of the anatomy, and injured functions of the parts wounded.

But one who is acquainted from anatomy or physiology with the uses of the parts, as far as they are at present known, will determine the consequences or effects of the wound as soon as the parts affected are known.

A maid-servant fell down with a glass mug in her hand, and wounded her arm betwixt the carpus and cubitus; a profuse hæmorrhage also followed, from a division of the artery running under the flexor carpi ulnaris muscle: the hæmorrhage was happily restrained by compressing the trunk of the artery against the os humeri in the upper part of the arm; but then the patient complained of a numbness in her little finger, and in the middle of the next finger, which the surgeon judged to arise from the compressure of the artery; but being confirmed in my opinion by the accurate tables of Eustachius, I boldly affirmed that the nerve was divided which goes to the little finger, and

to the middle of the next adjacent finger, and that therefore this complaint was irremediable. The event demonstrated the truth of my assertion: for after the cure was compleated, at my request, she frequently put her finger into the flame of a candle, without feeling the least pain.—*Vid. Van Swieten Comment. in Aphor. Boerhavii. Vol. I.*

Another important end anatomy serves, is, the determining the cause of the death of persons dying of natural diseases, from a subsequent dissection of the body——This may be called morbid anatomy.----Hereby we are shown the difference between the diseased and healthy state of the parts; and the latent causes of multitude of diseases have been long since discovered by means of these dissections, which otherwise we never could have known. Yet, there is here some caution necessary; for the dead body only shews us what its state was at the time of death, and many changes will be found made in it by the disease, which, however they may be the effects of the disease, would be very improperly reckoned to be the cause of it.

The knowledge of the real causes of a disease, is the first rational step towards its cure; and without the assistance of dissections, how was the world to have known that the *æfophogus* could

could have been burst in a violent fit of vomiting, that the spleen growing to an immense size could have fallen into the pelvis by an elongation of its connecting vessels, or have been informed of the nature of an empiema, a cataract, a hernia, and many others.

They are much mistaken, says Baglivi, who think they can cure diseases happily because they are masters of the Theory. They ought to have much higher things in view. They must dissect the bodies of those who die of distempers, and *foul their fingers*, to the end they may find out the seat of the complaint, the cause and issue of antecedent symptoms.

The ancients were so well convinced of the necessity of this knowledge, and to take, as they thought, the best method of attaining it, procured criminals out of prison, and dissecting them alive, contemplated while they were even breathing the parts which nature before had concealed, considering their position, colour, size, &c. for, say they, as various disorders attack the internal parts, they thought no person could apply proper remedies to those parts, which he was ignorant of.

The anatomical observations likewise made upon brutes have not only given great light to those

those made upon human bodies, but are exactly of a piece with them, nay, so certain and constant is that mutual analogy, that the structure of the viscera, and an infinity of other things have been discovered to the great happiness of the age we live in.

Without these neither would Herophilus have discovered the lacteal vessels in kids; Eustachius and Pecquet their receptaculum chyli and thoracic duct in the horse and dog, nor Harvey his celebrated circulation of the blood. Add to these that the inspections of carcases by priests in their daily sacrifices; the custom of embalming and opening the dead, as also dressing of carcases by the butcher, each afforded some knowledge of the anatomical structure of sound bodies, as well as the immediate and abstruse causes of health, sickness, and death.

All this could hardly be done for many ages together, without frequently detecting the latent causes of the most severe diseases as well as the structure and situation of the parts; and hence the first foundation of practical anatomy.

Frequent and destructive war furnished opportunities of discovering many of the muscles
and

and larger vessels, with the articulation of the bones, to the naked eye in the yet living subject; infomuch that some have attempted to extract a system of anatomy from Homer, who has in reality writ histories of wounds skilfully and anatomically stated

We have been taught also from practical anatomy that diseases frequently change the natural situations of the viscera, and this we are assured of from the most certain observations. The position of the stomach especially has been observed to be surprizingly perverted together with the other viscera of the abdomen, in the body of a woman after frequent vomitings. (*Mem. acad.* 1716, *page* 238.) And it seems very probable, that the viscera are thus even frequently displaced, since, says Van Swieten, I have several times made the like observation, in the subjects which I either dissected myself, or have seen dissected by others. I have seen the spleen prolapsed into the pelvis, the bottom of the stomach continued below the navel; and have also seen that part of the colon which lies under the stomach so reflected thence as to form an arch below the navel, the convex part of which was towards the pelvis, and its concavity towards the stomach.

The

The advantages which Surgery particularly derives from Anatomy being very evident, I shall next proceed to what I intend in the following lectures, which is to consider those bowels placed in the cavity of the Thorax.



PRÆLECTIONES



PRÆLECTIONES

IN QUIBUS

Tractandæ veniunt partes quæ in
Thorace sunt contentæ;

Unâ cum

Velamentis extus circumpositis.


Diaphragma, quod hujus ventris
pars esse magis quam infimi,
hoc loco describetur.

Variis inde deductis corollariis practicis.





PRÆLECTIO PRIMA.


 S the Diaphragm contributes in great measure to the formation of the cavity of the Thorax, and a knowledge of its situation and ample extent being of some consequence in practice, I shall begin with a description of this muscle.

We call the thorax that part of the trunk of the body which is terminated before by the sternum, behind by the twelve vertebræ of the back, on the sides by the arched ribs, above by the two superior ribs, and below by the diaphragm, which separates it from the cavity of the abdomen.

The diaphragm, or the musculus formâ mirus, as distinguished by Albinus, is a very broad and thin muscle, situated at the basis of the thorax, and which serves to partition off, by a very broad surface, the lower viscera, from those of the breast. It is placed obliquely, and forms a kind of arched roof, or concave dome, with
 its

its convex part towards the breast, and in such a manner that its fore-part rises much higher than its back-part, which is inserted lower, hence it is that the cavity of the thorax is much larger behind than before. Since the cavity of the thorax descends deepest towards the back, from the inclined posture of the diaphragm, therefore when we are about to perform the paracentesis of the breast, we should make our perforation as low as it can possibly be done, without danger of injuring the diaphragm. And to avoid hurting the strong muscles termed sacrolumbalis, longissimus, dorsi, &c. which ascend thro' the loins and back on each side the spina dorsi, the opening ought to be made at the distance of four fingers breadth, at least, from the vertebræ, and this is usually made betwixt the second and third, or betwixt the third and fourth of the spurious ribs, reckoning from below upwards. But since it appears from anatomy (*Albini histor. musculorum hominis*) that the vault of the diaphragm ascends higher in the right side of the thorax, for this reason, when the perforation is made on the right side, it should be performed betwixt the third and fourth rib; but when on the left side, betwixt the second and third of the spurious ribs.

Hippocrates takes notice, that if the matter or water be all of a sudden discharged from a

patient who has an empiema or dropfy of the thorax, it kills him; therefore fome would not have all the fluid extracted at once, but at feveral times. Now in an empiema or dropfy of the thorax, the lungs have lain a long time macerating in the matter, or in the extravafated ferum flowing all around, fo that upon evacuating it all, at one and the fame time, the lungs might have their weakened veffels burft by the fudden dilatation of them with blood, whence fudden death. What renders this operation the more eafily practicable, is the compreffure of the lungs by the extravafated humours, and the depreffure of the diaphragm by their weight, by which means thofe two organs are not eafily injured upon perforating the pleura.

The diaphragm is looked upon as a double and digaftric mufcle, made up of two different portions, one large and fuperior called the great mufcle of the diaphragm, the other fmall and inferior, appearing like an appendix to the other, called the fmall or inferior mufcle of the diaphragm.

The great or principal mufcle is flefhy in its circumference, and tendinous and aponeurotic in the middle, to this part the ancients gave the name of the nervous center of the diaphragm.

phragm. Senac has demonstrated, that the center or tendinous part of the diaphragm does not descend in inspiration, the pericardium including the heart being attached thereto; for the position and motion of the heart would be disturbed since the pericardium adheres with its broadest side to the tendinous part of the diaphragm. And that this part of the diaphragm does not descend, he also proves, from its structure and connection. Lieutaud, in his *Essais Anatomiques*, asserts, that the contrary is easily observed in opening living animals. His words are, “ l’on a dit que le centre tendineux
 “ ne descendoit point, à cause de ses attaches
 “ au mediastin; mais il est aisé d’observer le
 “ contraire dans l’ouverture des animaux vi-
 “ vants.”

This muscle has a radiated fleshy circumference, the fibres of which it is made up, being fixed by one extremity to the edge of the middle aponeurosis, and by the other to all the basis of the cavity of the thorax, being inserted by digitations in the lower parts of the appendix of the sternum, of the lowest true ribs, of all the false ribs, and in the neighbouring vertebræ.

We have therefore three kinds of insertions, one sternal, twelve costal, six on each side, and two vertebral.

The

The small or inferior muscle of the diaphragm is thicker than the other, but of much less extent. It is situated along the foreside of the bodies of the last vertebræ of the back, and several of those of the loins.

The oval opening of this inferior muscle gives passage to the extremity of the œsophagus, and the aorta lies in the interstice between the two crura.

In the middle aponeurosis of the great muscle, is a round opening which transmits the trunk of the lower vena cava. The circumference of this opening is formed by an intertexture of tendinous fibres, and is consequently incapable either of dilatation or contraction, by the action of the diaphragm.

We find therefore three considerable openings in the diaphragm, one round and tendinous for the passage of the vena cava, one oval and fleshy for the extremity of the œsophagus, and one forked, partly fleshy and partly tendinous, for the aorta.

The uses of the diaphragm are to assist in respiration, in which it is a principal instrument, descending towards the abdomen in inspiration, and rising upwards into the cavity of the thorax

rax in expiration: we are also to look upon this muscle as a power acting considerably upon the stomach, and abdominal viscera employed in digestion, for the diaphragm being depressed at every inspiration, all the contents of the abdomen are thereby compressed, and again in expiration they are repressed by the abdominal muscles.

From recollecting the various parts the diaphragm lies near to, and others with which it is immediately connected, it will not appear wonderful that an inflammation of it is sometimes taken for a disorder in some of the other parts. From thence also it will appear, that various symptoms may arise, according as different parts of the diaphragm become the seat of the disease. We see for certain that it grows to the pericardium, transmits or gives a passage to the æsophagus, aorta, vena cava, &c. lies closely incumbent about the liver, spleen, kidneys, and the rest—from whence an inflammation, swelling, or hard scirrhus tumour in this, or that part of the diaphragm may excite various complaints by injuring one or the other organ that lies next to it.

Leewenhoeck is persuaded that the diaphragm puts the whole abdomen into a continual motion, whereby the food in the stomach

mach and intestines is comminuted in such a manner as to be reduced into a fluid matter, fit to enter the absorbing vessels so numerous in the cavities of the intestines. He computes that, in a well constituted body, there is 900 respirations every hour, and so often will the stomach and intestines be compressed.

Leewenhoeck rather inclines to Dr. Jurin's opinion, viz. that the palpitation of the diaphragm is better grounded than that of the heart.

The very accurate Winslow observes, that the liver in the human body is so firmly attached by its ligaments, that it cannot easily slip from one side to the other; yet that it is not absolutely suspended by them, but is in part sustained by the stomach and intestines, especially when they are full. Hence after long fasting, the liver descending by its own weight, pulls down the diaphragm, and occasions an uneasy sensation, which the same anatomist thinks is unjustly ascribed to the stomach.

We have well attested instances of very small wounds received in this part, through which some of the bowels of the lower belly have ascended into the thorax. For while the contents of the abdomen are pressed by its muscles
and

and the diaphragm, they are forced through the wound in the latter, which they dilate, so as to pass into the cavity of the breast, and then by compressing the lungs and disturbing the action of the heart itself, death is sooner or later brought on.

Thus Parey affirms, he saw a man who was wounded in the tendinous part of the diaphragm, which, though no larger than the breadth of one's thumb, the stomach was notwithstanding forced through the wound into the cavity of the thorax. “ *Dissecto ventre inferiore (says he)*
 “ *ventriculum cum non reperirem, rem mon-*
 “ *stro similem arbitrabar. Sed tandem anxie*
 “ *perquirens, raptum ipsum in thoracem ani-*
 “ *madverti, etsi vulnus pollicem vix esset latum.*”

In another person, who had been wounded about eight months, and who died after the severest cholicky pains, the intestinum colon was found the greatest part of it within the cavity of the thorax, though the wound in the diaphragm was no larger than to be capable of receiving the end of one's little finger. “ *Mor-*
 “ *tui cadaver Jacobi Guillemeau chirurgi pe-*
 “ *ritissimi manu dissectum est, animadversum-*
 “ *que magnam coli partem, flatu multo tur-*
 “ *gidam, ipsi per diaphragmatis vulnus in tho-*
 “ *racem irrupisse, vulneris tamen amplitudo*
 “ *vix minimi digiti capax erat.*” *Paræus lib.*
 9. p. 30. D A

A like example is also to be met with in Sennertus, of a person who stabbed himself, but was cured of the wound within two months after, and notwithstanding which he expired, with frequent vomitings, seven months after the wound was healed. Upon opening the body, the wound appeared to have penetrated through the diaphragm and lungs, but the whole stomach was forced up into the left cavity of the thorax, and the heart with the pericardium was thereby pressed into the right side; when the patient was alive and cured of his wound, he would often direct those about him to feel the palpitation of his heart, by applying their hand. *Sennertus lib. ii. cap. 13. pag. 372.*

These are some of those wonderful sort of cases, for discovering which we have no certain signs, and can seldom know them but by opening the body after death, so that the errors which arise from our prognosticks of such wounds are unavoidable; for who could assert or foretel that the viscera were thus displaced, or by what signs could any one discover the same?

One ought to be well acquainted by anatomy with the true situation and connection of the diaphragm, and great caution is necessary in determining whether or no a wound penetrates into the cavity of the thorax, for as this cavity, as has been observed, ascends much higher
before

before, than behind, where it descends lower, very great errors have been sometimes committed, in thinking a wound penetrated the thorax, when it really entered the cavity of the abdomen. Thus we read in Ruyfch (*obs. anat. chir. obs. 65*) of an ignorant Surgeon, who being desirous to perform the paracentesis of the thorax, sent for him into consultation; but Ruyfch being indisposed and unable to go, the Surgeon by himself perforated the thorax as he thought; but soon after, a large number of hydatids forced themselves out through the wound, and the Surgeon, being affrighted, stopped the wound with a tent, and had recourse to Ruyfch, but to no purpose, for the unhappy woman died soon after; and upon opening the body, nothing of water appeared in the thorax, but the Surgeon, in perforating the abdomen instead of the thorax, had wounded the liver, which in that part adhered to the peritonæum, and seemed to have degenerated into hydatids, which burst forth through the wound.

Haller also tells us, that he opened the body of a man who died soon after the operation for the empiema had been performed on him. In the liver there was a purulent ulcer, but not deep, situated very near the surface of it and the diaphragm. He does not mean he says to throw the least reflection on those gentlemen who

had the care of this patient. To determine at all times where the liver terminates, and where the lungs, requires no small knowledge in anatomy, seeing the diaphragm diverges backwards from its anterior border, where it is highest, and descends from the fourth or fifth rib, as low as the twelfth, and even lower. Yet he concludes, opening the breast, in a disease of the liver, does no great honour to the operator. *See his Pathological observations.*

Having done with our account of this part, we should next pass on to those bowels in the cavity of the thorax, but before we proceed to examine these particularly, it will be first necessary to take notice of that membrane which lines its whole internal surface, known by the name of the pleura.

The pleura is a dense compact membrane, which adheres very closely to the inner surface of the ribs, sternum and intercostal muscles, and to the convex side of the diaphragm; it resembles the peritonæum, and likewise in that it is made up of an inner true membranous lamina, and a cellular substance on the outside.

The cellular portion goes quite round the inner surface of the thorax, but the membranous portion is disposed in a different manner. Each side of the thorax has its particular pleura, entirely distinct from the other, and making as it were

were two great bladders, situated laterally with respect to each other in the great cavity of the breast, in such a manner as to form a double septum or partition running between the vertebræ and the sternum, their other sides adhering to the ribs and diaphragm.

This particular duplicature, which is formed by a conjunction of the two sacculi of the pleura, is termed *mediaſtinum*; the two laminæ of which it is made up are cloſely united together near the ſternum and vertebræ, but in the middle and towards the lower part of the foreſide, they are ſeparated by the pericardium and heart—a little more backward they are parted in a tubular form by the *æſophagus*, to which they ſerve as a covering; and in the moſt poſterior part, a triangular ſpace is left between the vertebræ and the two pleuræ from above downward, which is filled chiefly by the *aorta*.

Before the heart, from the pericardium to the ſternum, the two laminæ adhere very cloſely, and there the *mediaſtinum* is transparent, except for a ſmall ſpace near the upper part, where the *thymus* is ſituated; ſo that in this place there is naturally no interſtice or particular cavity. Where the contrary has been ſhewn, it has been owing entirely to the common method of raiſing the ſternum, as is plainly demonſtrated by Bartholine in his treatiſe of the diaphragm.

At the upper part of the mediastinum, we find situated an oblong glandular body, called the thymus, which is round on its upper part, and divided below into two or three lobes, of which that towards the left hand is the longest. In the foetus it is of a pretty large size, less in children, and very small in aged persons. The greatest part of the thymus lies between the duplicature of the superior and anterior portion of the mediastinum, and the great vessels of the heart, from whence it reaches a little higher than the tops of the two pleuræ, so that some part of it is out of the cavity of the thorax, and in the foetus and children it lies as much without the thorax as within it.

There are various conjectures about its use, but as they are not supported by any proofs, shall forbear to mention them. And what the real purposes are, which it does serve, we are as yet unacquainted.

I once saw a suppuration in this gland in a lad I opened, and observed that the matter had emptied itself into the trachea.

Bonetus relates a case, where it was so much enlarged as to press upon the trachea, and occasion a difficulty of breathing.

Platerus

Platerus, in his observations, tells us that he has found it of so extraordinary a size, as by its compression to cause suffocation and death.

The mediastinum does not commonly terminate along the middle of the sternum, as has been generally supposed. And which at any time may easily be proved before the thorax is opened, by running a sharp instrument thro' the middle of the sternum; we shall find there will be the breadth of a finger between the instrument and the mediastinum, provided the sternum remain in its natural situation, and the cartilages of the ribs be cut at the distance of an inch from it on each side.

From all this we see, not only that the thorax is divided into two cavities, entirely separated from each other by a middle septum without any communication, but also that by the obliquity of this partition, the right cavity is greater than the left.

The cellular portion of the pleura connects the membranous portion to the sternum, ribs, and muscles, and in a word, to whatever lies next the convex side of the membranous portions of the pleura. It likewise insinuates itself between the laminæ of the duplicature, of
which

which the mediastinum is formed, and unites them together. It even penetrates the muscles, and communicates with the cellular substance placed at the back of the peritonæum, so that if an inflammation is succeeded by a suppuration here, the matter confined in the cellular substance, that lies between the plates of the mediastinum, may procure to itself wonderful passages (as it descends by its own weight) betwixt the pleura and the bodies of the vertebræ, where it may evidently form incurable sinusses and fistulæ, and make its appearance by a swelling in some very distant part of the body.—Instances of this kind are by no means uncommon.

And to what amazing distances matter will sometimes make its way, we read an example of in that excellent surgeon and faithful writer La Motte, “ *Traité complet de Chirurgie*, “ *Tom. I. page 357.*”——where he traced the matter of an abscess from the loins to the sole of the foot.

This always happens in the panniculus adiposus; it not appearing, from any credible observations, that the proper substance of the muscles has been at any time pervaded by a sinus or fistula.

We are well assured that the cellular membrane extends almost into every part of the body, and acquires different denominations, according to the different matter which it contains. In those parts of the body where this membrane is thinnest, its cells, being empty of oil or fat, escapes the eye, and is termed simply cellulosa—We should consider, that not only all the muscles and tendons are invested with such a cellular membrane, but that even every muscular fibre, as far as the eye and patient hand of the most acute and dexterous anatomist has been able to penetrate, is also invested with the same; almost every vessel in the body runs in or through such a cellular substance, which in part constitutes the fabric of the vessels and viscera themselves.—*For a beautiful and extensive account of this membrane, see Scobingerus de dignitate telæ cellulosæ in corpore humano.*

To return to the pleura——We meet with, in the celebrated Dr. Haller, a remarkable case of an hydrops faccatus pleuræ, or an incysted dropfy of this membrane: upon opening the thorax, to the no small astonishment of the persons present, there were no lungs (he says) to be found, but only a bag full of a green watery liquor, which, upon a further enquiry, was observed to have been extravasated between the intercostal muscles and the pleura, and that this

membrane, the use of which is to line the inside of the ribs, was separated from them in such a manner as to form a bag as large as the whole cavity of the breast. Hence the left lobe of the lungs was so much compressed, as to be rendered thinner than one's hand, and the cavity in which it was lodged no larger than a glove. This (he observes) is a very rare case, and shews, that an incysted dropfy may be produced in the thorax, from water collected in the cells of the pleura.

The same ingenious gentleman, from some dissections of persons dying of a pleurisy, is of opinion, that the pleura is much seldomer the seat of the disease, than is supposed; in those he opened, the pleura was perfectly sound, the seat of the abscess being in that part of the lungs which is contiguous to the diaphragm. This observation, he says, he could confirm by innumerable instances of the same kind. To this he adds, that the spitting in pleuretic patients, owing to the inflammation, is easily understood, if the seat of the disease is granted to be in the lungs; seeing, by the inflammation, part of the obstructing matter will make its way through the relaxed, exhaling, or mucous vessels into the bronchia. But how that matter can pass from the pleura to the aspera arteria, while the lungs remain sound, he leaves to those who are of that opinion to explain.

And

And from the rareness of the case of an inflammation of the pleura proving mortal, or producing that pus which is collected in the empiema, he would advise those who have the treatment of pleuretic people, to suspect the cause of that disease to be rather an inflammation of the lungs than of the pleura, and to have immediate recourse to the most powerful remedies.—See his Pathological observations.

In support of this opinion of Dr. Haller's, I shall bring the testimony of Peter Servius, from Triller's valuable treatise de Pleuritide, who, after opening three hundred persons deceased of pleurifies at Rome, always found one lobe of the lungs corrupted and distended with a putrid matter, but the pleura appeared not in the least affected.

Mr. Cheselden likewise ever found this to be the case, (he says) in opening such who were supposed to have died of pleurifies.

It is no novel opinion, that the lungs are the parts affected in a pleurisy—for Aurelianus reckons up a number of antient physicians, who defended this sentiment.

But to the mediastinum, the uses of this partition are to cut off all communication between the two cavities, by which, if one lobe

of the lungs is ulcerated, the other may not be immediately affected; that matter, water, or any thing else contained in one part of the thorax might not affect the other, and that, in case of a wound in one side of the thorax, respiration might be kept up in the other, and the person not immediately suffocated. Another general use it has, is, to support the heart with its pericardium as well as the diaphragm, by means of which, the stomach, the liver, and the other viscera of the abdomen attached thereto, cannot, in drawing down the diaphragm too forcibly towards the inferior parts, interrupt the action of the heart and respiration.

It may here be questioned, whether a latent abscess under the sternum cannot have a discharge of its matter by an opening through the sternum, lest the pericardium and heart should be corroded by the confined and putrid matter?

Examples are not wanting in writers too of great credit, of the trepan's having been successfully applied over this part, in order to give vent to a collection of matter or water underneath.

Galen gives a remarkable case of a lad, who received a blow upon his sternum, and being
negli-

negligently treated, that part of the sternum appeared afterwards corrupted by a sphacelus. Galen, trusting to anatomy in which he was so well skilled, cut out the carious part of the sternum, and tells us, he was able to see the naked heart, whose pericardium was eaten through, under the carious part of the bone; yet this lad was cured in a short time.

We are assured, by the celebrated Van Swieten, that he has seen matter, after a supuration in the thorax, making its way through the sternum, which shews such a method of cure is possible.

We may therefore reasonably conclude, that when there are evident signs demonstrating a latent empiema seated beneath the sternum, an opening into it may be very safely attempted; notwithstanding the assurance given us by Dionis in his anatomy, that he saw the sternum unsuccessfully trepanned in a wounded gentleman, who afterwards expired: for it does not in that case appear that his death could be ascribed to the operation, but rather to his wound; and enough has been said to shew that people have survived an opening made through their breast-bone, and as a further confirmation, shall produce one more instance from Haller's *Prælectiones Academicæ*, where we are told, that a certain Divine at Amsterdam
had

had the trepan successfully applied to this part, and who was by this means freed from a great quantity of matter, and the heart was thus left so naked, that by applying a looking-glass opposite to the wound, he could see his own heart beating, which he appeared to take some pleasure in, he being a man of uncommon taste, and the author of a celebrated treatise, denying the existence of devils.



PRÆLECTIO SECUNDA.

HAVING gone through the description of the pleura with its reduplicated plates composing the mediastinum, I shall next proceed to the examination of the heart, with its capsula the pericardium.

The pericardium is a membranous sack of a pretty firm texture, which immediately includes the heart, and is placed between the two laminæ of the mediastinum.

The capacity of the pericardium is equal to the size of the heart, and is not as large again, as some anatomists have imagined; and if it seems larger than necessary to cover the
heart

heart when a body is opened, it is wholly owing to the heart's emptying itself at the moment of death, not only of the blood contained in its ventricles, but also that of the coronary arteries, by which means, its volume is prodigiously diminished—This is an observation of Lieutaud's.

The pericardium is composed of two membranes, and of a cellular web which joins them together: the outward membrane is tendinous and very compact, and the inward is thin and polished, being moistened on all sides by a watery vapour. It must be observed, that not only this cavity, but the interstices in the abdomen, thorax, and all other cavities of the living animal, are replenished with moist vapours discharged by exhaling vessels—the existence of which, in the superficies of the heart and its auricles, may be proved by a similar transfusion of water or fish-glue injected into the large arteries: with this moisture, the heart will be lubricated, and that friction prevented, which might inflame and occasion its adhesion to the pericardium. But if these exhaling arteries discharge more plentifully than the veins absorb, this fluid will be accumulated to the quantity in which we often find it. By this means, when the absorbing power declines in chronical disorders, there is frequently produced a dropsy of the pericardium, and in which

which case it has been found distended with several pounds of liquor.

We may be sensible how necessary this moisture is to lubricate and separate the viscera, and especially the heart, from the histories given us by Peyerus, in which the patients were troubled with the most violent oppressions and palpitations, because for want of this moisture the heart was found dry, and adhering to the pericardium.

The tendinous part of this bag has nine apertures or holes, as well for the passage of those vessels which enter into its cavity, as those which issue out of it; that is, two for the venæ cavæ, four for the pulmonary veins, one for the trunk of the aorta, and two for the pulmonary arteries.

The connexions of the pericardium are, with the principal vessels, just now mentioned; it is also adherent, in a great part of its extent, to the aponeurotic portion of the diaphragm, so as to be inseparable without laceration; by which means, it sustains that broad muscle with the several viscera connected pendulous to it, so that the diaphragm cannot by their weight be drawn down too low in the abdomen in our erect posture.

It has been said, that this capsule has sometimes been found wanting.—Columbus tells us that he opened a student who died of a fit in the university of Rome, and that in this subject he could find no pericardium, but it seems more probable, that from a preceding inflammation, it had united itself so closely with the heart as to have deceived him: certain it is, that the coalition of this membrane is much more probable, than the entire want of it.

Ruyfch kept by him the heart of a man who laboured under a continual fever, with an intolerable pain about the fore-part of his breast; but the outer surface of this heart was altogether rough or unequal, from the pericardium being grown to its surface.

Lower produces a like instance of its adhering every where so closely to the heart, that he found it difficult to separate it with his fingers.

It is probable, inflammations of the mediastinum and pericardium happen oftener than is commonly believed; for the causes producing them may very powerfully act upon these parts, namely, the cold air, or the drinking of large draughts of cold liquors by persons much heated; but the pericardium is seated betwixt the lungs, by which it is almost every way surrounded, so that the cold air inspired is, by the

dilated lungs, applied to the contiguous mediastinum and pericardium, and the æsophagus, transmitting cold drinks, go along betwixt the two receding plates of the mediastinum, and passes the diaphragm behind the pericardium; the principal signs of this malady are such causes already mentioned, and a great heat felt in the midst of the thorax; to which add a great disturbance of the pulse, and fainting fits, when the inflammation has spread to the pericardium.—If a suppuration shall be formed in the pericardium, it may penetrate the cavity of that bag, and lie round the surface of the heart.---Columbus (*de re anatomica, lib. xv. p. 267.*) found the heart every way surrounded by an abscess, by which it was almost consumed.

An inflammation of the mediastinum is very fairly confirmed by the observations of Avenzoar, who writes that himself laboured under this malady—Upon his first disorder, which happened in a journey, he felt a pain in that part, which increased with a cough; he found his pulse very hard and his fever very acute. The fourth night, he took away a pint of blood; his symptoms were but little relieved; but in the night, and while asleep, the bandage of the arm came off; upon waking, he found the bed swimming with blood, and soon after recovered. The symptoms in this disease are generally,

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generally, he says, a continual successive cough, a tenfive pain lengthways, a difficulty in breathing, an acute fever, great thirst, and a hard unequal pulse.

This physician not only takes notice of an abscess in the mediastinum, but in the pericardium likewise.

Salius Diverfus, who has with good judgment given us an account of several distempers, overlooked by the generality of writers, describes this disorder in a different chapter by itself, and says, it had been taken notice of by no practical author before him. His description of the symptoms, which follow upon an inflammation here, is very exact and particular; and because the case is one pretty much out of the way, tho' without dispute, such as does often occur in practice, and may be easily discerned, if well attended to, I shall just give a sketch of what he observes, (which indeed answers to what I have recited from Avenzoar) from the learned Dr. Friend's history of physick—There is (says he) an acute fever, inquietude, thirst, breathing thick and quick, great heat in the thorax, little pain except at the sternum, a cough always with it, and a hard pulse. When the pericardium was inflamed too, there was a more intense heat, and a frequent syncope; in one word, all the symptoms worse. And for a proof of what he asserts, he gives the case of

one, who died on the ninth day after some fits of the syncope: where, upon dissection, there appeared an inflammation of the intersepiant membranes, as he calls them, and some part of the pericardium. And this distemper, I don't question, happens oftener than our practitioners commonly are aware of. He confesses that he gave a more diligent attention to all these circumstances, because, being then young and compleating his studies under very eminent professors, he had seen a man of quality labouring under the above distemper, which had all the symptoms before enumerated, and who, beyond all expectation, expired, when every thing seemed to change for the better; but he was several times troubled with fainting fits before his death. But as the physicians were here doubtful of the malady, and his friends suspected poison had been given him, they desired an enquiry to be made after the cause. Upon opening the thorax, an inflammatory swelling of considerable bulk was found in the mediastinum; and an inflammation had in part seized upon the pericardium. Nor was there any other apparent cause of death found in the body of the deceased.

Columbus takes notice of collections of matter in the mediastinum, and which he and Barbette order to be taken out by trepanning the sternum.

As a further and more convincing proof of what has been remarked, a gentleman, justly esteemed (says Dr. Friend) for his long experience and sound judgment in every thing relating to surgery, informed him, that abscesses of the mediastinum particularly happened in venereal distempers, and that, in such cases, he has frequently used the trepan with great success. We may from hence be satisfied, how little ground there is for that hint of Parey, where he seems to think this operation a ridiculous attempt.

Since the treatise of Peter Salius is rarely to be found, you may read the chapter of Schenkius that contains the whole, “ de inflammatione membranarum intersepiantium et pericardii—de tabe ex affectu pericardii—de tumoribus diaphragmatis.”

Of the HEART.

The heart is a muscular body, situated in the cavity of the thorax, being placed nearly in a transverse or horizontal posture, with its basis in the right side of the thorax, and its apex in the left, while its broadest and flat side, from the basis to the apex lies inclined and supported on the diaphragm, to the tendinous or middle part of which it is firmly connected by the vena cava, and right venous sinus

finus below; and above, in the thorax, it is connected within the duplicature of the mediastinum, and lodged betwixt the soft lobes of the lungs; by all which means, it avoids too great a pressure on any side, and is most commodiously adapted to receive the blood from, and propel it into all parts of the body.

This is the true position of the heart in the human body.—The figures in many of our modern anatomists are erroneous in this respect—But the figures of Vesalius, Eustachius, and Ruysch, shew the heart in its natural posture. From what has been said here, we may resolve the question, why over-eating causes a palpitation of the heart; for since the heart is only separated from the stomach by the diaphragm, when the stomach is over distended, it will force up the diaphragm, and press upon the heart. Hence also we may see how the heart comes to be pressed up so high in the thorax of those who die of a dropsey in the abdomen, and why it is forced so far down in the abdomen of those who die of a dropsey in the thorax; because the diaphragm, to which the heart is connected by its pericardium, is forced either way by the contained water.

At the basis of the heart are situated two muscular bags, one towards the right ventricle,

cle, the other towards the left, and joined together by an inner septum, much in the same manner with the ventricles, one of them being called the right auricle, the other the left. They are very uneven on the inside, but smoother on the outside, and terminate in a narrow flat indented edge, representing in some measure the ear of a dog; they open into the orifices of each ventricle, called by the name of the auricular orifices, and they are tendinous at their opening, in the same manner as the ventricles.

The right auricle is larger than the left, and it joins the right ventricle by a common tendinous opening, just taken notice of. It has two other openings united into one, and formed by two large veins which meet and terminate there almost in a direct line, called vena cava superior and inferior.

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In opening a dog, not long since, at the request of a lady, I found the pericardium amazingly stretched with blood, so as to fill half the space of the thorax, with an aperture at the meeting of the two venæ cavæ, large enough to admit the end of a finger. In Bonetus's Sepulchret. Anatomic. we meet with two or three instances of ruptures in this vein in the human subject.—*Tom. I. p. 881. sect. xi. de morte repentina.*—*Obs. I. Mors subita ob effusum*

fusum sanguinem in dextrum cordis sinum et pericardium, á ruptura venæ cavæ.—Obs. 2. Cui-dam morte concidente, fodiendi labore fatigato, vena cava prope cor disrupta, sanguine inundavit viscera.

The whole inner surface of the right auricle is uneven, by reason of a great number of prominent lines which run across the sides of it. In the interstices between these lines, the sides of the auricle are very thin and almost transparent. There is an observation in Dionis, where he found this auricle so far dilated, that it was equal to the head of a new-born infant.

The left auricle is in the human body a kind of muscular bag, or reservoir of a pretty considerable thickness, into which the four pulmonary veins open. The whole common cavity of this auricle is smaller in an adult subject, than that of the right.

The fleshy or muscular fibres of which the heart is made up, are disposed in so singular a manner, that their course will be much easier understood by seeing than describing them.

The heart is divided by a septum, which runs between its edges into two cavities called ventriculi, one of which is thick and solid, the other

other thin and soft : this latter is termed the right or anterior ventricle, the other the left or posterior ventricle.

Lower, in his treatise *de corde*, tells us, that in a person who died of a consumption, and was subject to fainting fits in his life time, he found both the ventricles of the heart nearly closed up, particularly the right, by a fleshy substance, so as scarce to leave room for the admission of a goose-quill.

We had lately a melancholly instance of a rupture, in the side of the right ventricle; and which occasioned the death of our late King.

Each ventricle opens at the basis by two orifices, one of which answers to the auricles, the other to the mouth of a large artery, therefore one of them may be termed the auricular orifice, the other the arterial orifice. The right ventricle opens into the right auricle, and into the trunk of the pulmonary artery, the left into the left auricle, and into the great trunk of the aorta.

At the edges of these orifices are found several moveable pelliculæ called valves, of which some are turned inward towards the cavity of the ventricles called tricuspides, others are turned towards the great vessels called semilunares.

The inner surface of the ventricles is very uneven, many eminences and cavities being observable therein; the most considerable eminences are thick fleshy productions, called columnæ, to whose extremities are fastened several tendinous chords, the other ends of which are joined to the valvulæ tricuspidæ.

The valves at the orifices of the ventricles are of two kinds, one kind allows the blood to enter the heart, and hinders it from going out the same way, the other kind allows the blood to go out of the heart, but hinders it from returning. The valves of the first kind terminate the auriculæ, and those of the second lie in the openings of the great arteries.

The tricuspidal valves of the right ventricle are fixed to its auricular orifice, and turned inward toward the cavity of the ventricle. They are three triangular productions, very smooth and polished on that side which is turned towards the auricle, and on the side next the cavity of the ventricle, they have several membranous and tendinous expansions.

The valves of the auricular orifice of the left ventricle are of the same shape and structure, but are only two in number, and from some small resemblance to a mitre, they have been named mitrales. These five valves are very thin, and fastened by several tendinous ropes to the fleshy columnæ of the ventricles. The

The femilunar valves are fix in number, three belonging to each ventricle, situated at the mouths of the great arteries, and may properly be called *valvulæ arteriales*. The great artery that goes out from the left ventricle is termed *aorta*; as it goes out, it turns a little toward the right hand, and then bends obliquely backward to form what is called *aorta descendens*.

It is at the arch or curvature of this great vessel, that we oftner meet with the true aneurism than elsewhere; though Dr. Haller, in his pathological observations, cites an instance of one in the carotid artery, which reached from the subclavian to the division of the two branches of the carotid, and the surgeon, misled by a kind of undulation, was preparing to lay it open.

It appears from anatomy, that the arteries, especially the larger, have pretty thick coats, partly cellular and partly muscular; so that when the strength of the sides of an artery is diminished by any cause, the consequence will be, that it will be dilated most in its injured part, so as to change the natural figure of the vessel, by distending its weakest part into a sacculus.

We find, upon examining the histories of this disease, that they have for the most part

arose from blows and contusions about the breast, some again from an overstretching of their coats in violent straining, others from erosion.—Examples, where they have sprung from each of these causes, we meet with in Lancisus.

Ruyfch has an observation of one at the curvature of the aorta, which was so large as to equal a common cushion.

It is found that in process of time the blood in these tumours begins to corrupt and become so acrimonious, as to corrode the adjacent soft parts, and does not even spare the compact bones. And Ruyfch observes in his case, that almost all the ribs and sternum of the patient were reduced nearly to nothing.—Sometimes these poor unhappy patients expire hereby in a moment. We read of a soldier, in the Academi. des Sciences, who sustained a large aneurism of this kind for some time, when a flux of blood suddenly burst forth from his mouth, of which he expired in a minute. Upon opening the body it was found, that the aneurism adhered to the trachea, into which it had an opening betwixt the sixth and seventh cartilage, by which the blood escaped into the windpipe and out of the mouth.

Surgeons should be very careful to distinguish well this kind of tumour from others,
since

since we are taught, by many observations, that several, in other respects skilful men, have imprudently destroyed the patient by opening them.—That it is an aneurism, may be collected—from the fore-mentioned causes having preceded, from the tumor being seated in a part, where we know from anatomy, there is some large artery seated, but more especially when it has a manifest pulsation, and if the tumor diminishes by a slight pressure, and returns again when the pressure is removed.

As aneurisms in the internal parts of the body are inaccessible, all that can be done for the patient is, to abate the impetus of the blood's motion by a thin diet, and repeated bleeding, by which means, the disorder may be prevented from increasing as much as possible, and the patient at the same time be ordered to refrain from all commotions of body and mind.

The trunk of the artery, which goes out from the right ventricle, is called *arteria pulmonaris*.—This I shall leave to the particular history of the lungs.

Besides the great common vessels, the heart has vessels peculiar to itself, called the coronary arteries and veins, so named from their crowning in some measure the basis of the heart,

heart, they go out from the beginning of the aorta, and send numerous ramifications to the substance of the heart.

This organ, with the parts belonging to it, are the principal instruments of the circulation of the blood.

The heart is made up of a substance capable of contraction and dilatation ; when the fleshy fibres of the ventricles are contracted, the two cavities are lessened in an equal and direct manner, not by any contorsion or twisting, as some have imagined ; and from considering its structure, we must see, that it tends to make an even and uniform contraction, more according to the breadth or thickness, than according to the length of the heart, because the number of fibres, situated transversely, is much greater than the number of longitudinal fibres.

The fleshy fibres thus contracted do the office of suckers, by pressing upon the blood contained in the ventricles, which blood, being thus forced towards the basis of the heart, presses the tricuspidal valves against each other, opens the semilunares, and rushes through the arteries and their ramifications, as through so many elastic tubes.

The blood thus pushed on by the contraction of the ventricles, and afterwards pressed by the elastic arteries, enters the capillary vessels, and is from thence forced to return by the veins to the auricles, which, like porches or antichambers, receive and lodge the blood returned by the veins, during the time of a new contraction.

This contraction is called the systole of the heart.

The contraction or systole, ceasing immediately by the relaxation of the fleshy fibres, and in that time, the auricles which contain the venal blood being contracted, force the blood through the tricuspidal valves into the ventricles, the sides of which are thereby dilated, and their cavities enlarged.

This dilatation is termed the diastole of the heart.

In this manner does the heart, by the alternate systole and diastole of its ventricles and auricles, push the blood through the arteries to all parts of the body. Therefore the authors of the hypothesis, which makes the right ventricle to contract itself before the left, have been deceived, as Haller has clearly evinced, by some experiments you will find in a late
ingenious

ingenious treatise of his ‘ *Sur le Mouvement du sang.*’

Wounds, which penetrate the cavities of this bowel, or by which any of the large blood vessels issuing out of it are opened, are considered as absolutely mortal.

It is to be remarked in wounds of the right ventricle of the heart, that the lungs continue to act, and by their dilatation, give an easy passage to the blood to enter into them from that ventricle; hence therefore there will not be so much blood expelled by the wound during the systole of the heart, because of the free passage which it meets with into the lungs, whence again such a wound will have the greater opportunity to unite and heal.

But wounds of the left ventricle seem to be much more dangerous, since, if it be not totally perforated, the wound will of necessity be continually enlarging by the very strong power with which the left ventricle contracts, and which greatly exceeds the force of the right ventricle, in order to protrude its contained blood into the strongly resisting aorta, so as to dilate the same and all its branches throughout the whole body.

However,

However, we ought never to despair even in the most dangerous wounds. For there are some observations which shew, that men have often lived a considerable time after wounds of the heart, especially when the right ventricle only has been perforated. Even some observations teach us, that wounds of the heart are curable. See *Bartholine's Centur. i. Histor. 77.* --- *Schenckii Obser. Med. Rar. p. 275.* --- *Saviard and others.*

For while the patient continues only in a very weak and languid state, we may have seen in practice, I dare say, that wounds have been healed, which no one would have thought possible; and the likeliest method to succeed is to keep the patient very quiet, and to avoid exciting the circulation by any stimulus, especially those called cordials, which should be carefully avoided; the life of the patient may possibly be preserved, and the wound healed.

For nobody would believe with how small a quantity and motion of the blood a person may live, who is not acquainted with the instances given us by practical writers in the cases of wounds, and in the miscarriages of women.

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There is a disorder that pretty often occurs, though not much remarked, nor well described, which is, *an aneurism of the heart*, or a preternatural enlargement of its cavities; for while the heart's force exceeds the resistance of the arteries, it continues of the same dimensions, but when the resistance of these last from

being

being grown rigid and boney exceeds the force of the heart, its cavities then enlarge.

Practical anatomy furnishes us with many observations, teaching that the heart is thus frequently distended: we meet with one in the philosophical transactions, where the left ventricle was found three times larger than the right.-----Fernelius, (in his *Pathologia lib. v. cap. 12.*) gives an account of a very uncommon and surprizing case of this kind; where he says, the frequent concussions of the heart were so violent and strong, as not only to luxate, but even to break some of the adjoining ribs.

Marchettis in his anatomy, tells us, that he found a heart so big, as to possess the whole thorax, and the ventricles of a prodigious extent, chiefly the right, that a natural sized heart might be contained in it.

But among the rarer causes of this preternatural distension of its ventricles, we may reckon the air, which has been sometimes found in the cavities of the heart, distending them immensely.

In a woman, who died suddenly, Ruyfch found the heart of a stupendous magnitude, from the air, with which it was full, contain-

ing scarce any blood, as appeared from entering the point of a knife into it, the heart suddenly subsiding, as if one had punctured a bladder full of air.

Morbid dissections convince us, that in the heart have been found, inflammations—suppurations—erosions.

I shall add to that of our late King an instance of this sort, from the Acad. des Sciences—Where, upon opening the body of the Duke of Brunswick, the heart was found eroded by ulcers, and the right ventricle appeared burst, from such an ulceration and erosion.

Morand, in the same papers, furnishes us with another more surprizing instance----Who, upon searching after the cause of sudden death in the body of a nobleman, there appeared, upon flitting up the pericardium, a large mass of congealed blood, and in the left ventricle, a perforation, which was equal to eight lines in length, and the fleshy substance of the heart appeared so infirm, that the probe made its way through, in every part, by its own weight.

—The two foregoing extraordinary cases we meet with, in the Acad. des Sciences for the year 1732, under the following title, *Sur*
Quelques

*Quelques Accidens remarquables dans les Organes
de la Circulation du Sang.*

When the cause of a gangrene in the extremities of old people lies in the weakness of the heart, so as to be unable to propel the blood into the extremities, we may well despair of a cure.

In the following histories, the powers of the heart seem to have been so weak, as not to be able to disentangle the vessels, which were folded together by the slightest pressure that could be.

Tulpius records a remarkable case of an old dotard, who had long struggled with weakness, and the heat of the parts so far extinguished, that every the least pressure upon any part of the body was immediately followed with a gangrene; so that in a short time every part about him was almost mortified before the poor miserable wretch was actually dead.

The celebrated Van Swieten tells us, that he had seen himself a resembling case in a woman of 90, whose extreme parts were not only mortified before she died, but also the cheek which lay on the pillow while she slept.

From

From polypous concretions, whether formed in the heart or in its greater vessels, arise many irregular and terrible symptoms.

Sometimes they have been found lying loose in the cavity of the heart---at other times they have been found adhering to the vessels themselves, and to the columnæ and auricles of the heart; of which there is a very remarkable one, both history and representation, in Bartholine's Centuriæ.-----Those who are curious to know more of this matter, may consult Malpighius's treatise of the polypus of the heart, who was the first (and since him Ruysch) who threw any light upon this subject, which before his time was entirely in the dark.

There is but little hope of curing a confirmed polypus. All that can be aimed at, is, to dilute the blood, and so throw it into a state most remote from concretion, *i. e.* to introduce by art that cachochymy which consists in the blood's being too thin, to the end the polypus may not be increased by the apposition of new matter, but by degrees be worn away by the constant attrition of the blood, which is every moment passing by it.



PRÆLECTIO TERTIA.

HAVING considered the heart with its pericardium, we come next to the description of the lungs.

The bags of the pleura are exactly filled by the lungs, which are two large spongy bodies filling the whole cavity of the thorax, one being seated in the right side, the other in the left, parted by the mediastinum and heart, and of a figure answering to that of the cavity which contains them; that is, convex next the ribs, concave next the diaphragm, and irregularly flattened and depressed next the mediastinum and heart.

The right lung is larger than the left, answerable to that cavity of the breast, and to the obliquity of the mediastinum, and more frequently divided or half cut through into three distinct lobes or portions; but the left lung is not so often divided into three.

At the lower edge of the left lung there is an indented notch or sinus, (and which Eustachius

stachius has taken care to express in his Tables) opposite to the apex of the heart, which is therefore never covered by that lung even in the strongest inspirations, and consequently the apex of the heart may always strike against the ribs, the lungs not surrounding the heart in the manner commonly taught.

The substance of the lungs is almost all spongy, being made up of an infinite number of membranous cells, and of different sorts of vessels spread among the cells, in innumerable ramifications.

This whole mass is covered by a membrane reflected from each pleura. Betwixt the lungs and pleura is found a watery or serous vapour, of a coagulable nature, like that of the pericardium, which vapour transudes from the surface of the lungs and pleura, (*see the celebrated Kaau, de perspirat. diæta Hippocrati per universum corpus anatomice illustrata*) and is sometimes accumulated so as to form a dropsy of the thorax.

The chief vessels of which the substance of the lungs is composed are the air vessels and blood vessels; the air vessels make the chief part, and are termed bronchia, and which are branches or ramifications of a large canal,
partly

partly cartilaginous and partly membranous, called trachea or aspera arteria.

The trachea or aspera arteria is a tube or canal, extended from the mouth down to the lungs. The larynx or head of the trachea forms the protuberance in the upper and anterior part of the neck, called commonly pomum adami.

It is constituted of five cartilages, viz. the cartilago thyroides, which is the anterior and largest, cricoides the inferior, and basis of the rest ; two arytenoides, the posterior and smallest; and the epiglottis, which is above all the rest.

The ventricles or facculi, mentioned by the antients and restored by Morgagni, (who has given an excellent description of them, and of the whole structure of the aspera arteria) lie under the glottis, and are formed by a continuation of the internal membrane of the larynx.

The larynx serves particularly to admit and let out the matter of respiration ; and the solidity of the pieces of which it is composed hinders not only external objects, but also any hard thing which we swallow, from disordering this passage. The glottis being a
I very

very narrow slit modifies the air which we breathe, and as it is very easily dilated and contracted, it forms the different tones of the voice, chiefly by means of the different muscles inserted in the arytenoide cartilages.

The facility of varying and changing the tone of the voice depends on the flexibility of the cartilages of the larynx, and decreases in proportion as we advance in age, because these cartilages gradually harden and ossify, though not equally soon in all persons.

The general use of the epiglottis is to cover the glottis like a penthouse, and thereby hinder any thing from falling into it, when we eat or drink; and which is sometimes the case when we laugh or talk at the time of swallowing.

Haller tells us, that upon tracing the cause of low voice, and at last an entire loss of speech in a woman. He found that one half of the epiglottis was covered with an ulcerous tumor here and there eroded, and which he imagined to be the cause of the defect in her voice, and was astonished that she was not suffocated.

The anterior and convex side of the larynx is covered with the thyroide gland. The
learned

learned Morgagni has remarked, that this gland is represented double by most authors, though in reality it is single, and resembles the moon in its increase, the horns pointing upwards.

Eustachius has very accurately delineated this gland, in his Anatomical Tables, but it is there four times smaller than natural.

With regard to its use—notwithstanding the excretory ducts have not been ascertained, yet it is probable, from its situation and connexion with the trachea and œsophagus, that they pour a lubricating fluid into them, and it is not likely, that so large a gland upon the trachea should be so closely connected in that place without some use.

Tumors very often happen in this gland; but such a swelling is not properly a bronchocele, (though sometimes so miscalled) but a struma.

In morbid bodies this gland has been found enlarged to an extraordinary bigness, so as to reach down almost to the clavicles; and in such cases they generally turn scirrhus; when it is very large, neither any inward medicine nor outward application can dissolve it. Neither would any prudent surgeon, I presume, at-

tempt to extirpate such a large tumor, for fear of an hæmorrhage, or wounding the recurrent nerves. And Petit, in his Edit. of Palfin's anatomy, vol. II. chap. ix. p. 313, gives us a sufficient caution, in telling the story of a daring surgeon, whose patient in such a case expired under his hands, to the great scandal of the profession.

There are other sorts of tumors seated in the forepart of the neck, and particularly described by Albucasis, and which description I shall transcribe from Dr. Friend.

In treating of a bronchocele, or a rupture in the forepart of the neck, which he says is most frequent in women, he is fuller than the Greeks or Celsus; he makes two species, one like a tumor which contains some gross substance, the other like an aneurism. But tho' he is so bold in using the knife, he advises the operation only in the former case; and even not there neither unless the tumor be loose, and little, and enclosed in a cystis.

Sometimes these excrescencies are full of water, and sometimes they have nothing in them but air.

This is a very frequent distemper in those countries where they drink great quantities of
cold

cold water, especially where they do not cool their waters in snow, as in other warm climates; but pour ice into it, as the way is with the ordinary people who live upon the black mountains of Genoa and Piedmont. The matter of fact is as true, as that they themselves attribute it to the drinking this water; and from the nature of cold, it is not difficult perhaps to account for the effect. And that the coldness not only of the liquors, but of the climate itself in other countries, may produce the same effects, seems to be plain, from the observations we find in writers, that these swellings about the throat and head, are more frequent among the northern nations than the southern.

We have several instances of diseases which are peculiar to some particular country, and seldom known any where else. Thus in Europe the *plica polonica* is proper to the Poles---the scurvy to the borderers upon the Baltic Sea---and the *guttur tumidum* to such as dwell below the Alps. Thus in Asia, the *vena medinensis* or *dracunculus* is peculiar to the Arabians. So in Africa, the *eliphantiasis* was always the *peculiare malum Ægypti*, as we learn from Pliny.

The

The following quotation from De la Faye's notes upon Dionis, *des Operations de Chirurgie*, p. 640, will shew that a true bronchocele takes place here sometimes.

“ Le Goetre, comme Dionis le remarque,
 “ n'est pas une hernie, parce qu'il n'est pas
 “ formé de parties déplacées. Mais il survi-
 “ ent quelquefois à la gorge une veritable
 “ hernie qu'on peut appeller proprement bron-
 “ chocele ou hernie de la trachée artère; car
 “ elle est formée par le déplacement d'une
 “ partie de la membrane intérieure de ce con-
 “ duit. Cette membrane en se dilatant passe
 “ entre les anneaux cartilagineux de la tra-
 “ chée artère, et forme a la partie antérieure
 “ du col un tumeur molasse, sans douleur, de
 “ meme couleur que la peau, et qui s'étend
 “ quand on retient son haleine. Cette espece
 “ de maladie dont M. Muys dans ses observa-
 “ tions, et Manget dans ses notes sur Bar-
 “ bette, font mention, est fort rare, et nuit
 “ beaucoup a la voix et à la respiration.”

The aspera arteria or windpipe, consisting of semicircular cartilaginous segments with their back parts membranous and connected together by strong muscular ligaments, gives a free ingress and egress to the air from the glottis which is always open, and lined with a smooth lubricated membrane, so that
 it

it will expand circularly by the air, give way to the œsophagus in deglutition, follow the posture on bending of the neck, and become either elongated or contracted, as there may be occasion. The whole membrane, which constitutes the back of the trachea, where the circular cartilages are deficient, is beset with small glands, which separate an unctuous humour, discharged by their ducts, into the cavity of the trachea.

This canal is lined on the inside by a fine membrane so extremely sensible, that nature has placed it as a guard to watch at the door of our breath and life, that we might not be suffocated by any particles falling into the trachea; for all bodies irritate it but the pure air; even a drop of clear water excites a convulsive and troublesome cough, which does not cease till the liquor is ejected. This membrane has several small ducts (as has been observed) opening into it, which continually pour out a mucilaginous fluid, and which is of the greatest use in defending it from being injured by any acrimonious particles that may float in the air.—This mucus, when left long undisturbed, may become so tough and solid as to take the form of blood vessels; which, as Ruyfch justly observes, has made some of the most diligent observators give us histories of clusters of vessels of great bulk being at once ejected

ejected by coughing, (Tulpius among others has done this with two figures representing, as he thought, the vessels coughed up) whereas in fact it was only matter inspissated and moulded in the lungs.

If the windpipe be injured even with a large wound, and the air has a free passage into the lungs, that wound will not always prove mortal; there are cases which incontestably prove this, in which people being weary of their lives have laid violent hands on themselves, or in which the throat has been cut by robbers, and yet they have been cured.

There are many who believe all wounds of the trachea mortal, and some have declared as much in their writings. But the true state of the case is, that when any of the large adjacent blood vessels are wounded, it is from the injury done to them that the patient dies.

In Heister's observations, there is an instance of a gun-shot wound of the trachea cured, and where a piece of the trachea was carried away. (*See ob. 80.*)—and of which, says he, as much as I can call to mind, I have not met with an example of in other authors.

Van Swieten remembers a soldier who used to beg his way, and make a show of a large wound

wound or aperture in the windpipe, which he would stop with a sponge, and then he could speak very well, but by opening the hole he lost his voice. This accident arose from part of the windpipe being torn off by a bullet in battle, so that the lips of the wound could not be afterwards brought together without leaving a considerable aperture, yet he survived the accident many years.

This last case brings to my remembrance a device I used in a wound of this part, which a gentlewoman under a discontent of mind had inflicted upon herself with a razor, just below the larynx, between the thyroide and cricoide cartilages, with a loss of part of the substance of the latter; as there was here (besides bringing the divided parts as near together as possible) another intention, that of contributing to restore the loss of substance—I recollected Marchetti's contrivance in a fistula which penetrated the aspera arteria, and which I shall give in his own words, “ Multas sanavi
 “ fistulas colli, potissimum vero qua laboravit
 “ adolescens quatuordecim annorum, in parte
 “ ejusdem anteriori, infra laryngem, oborto
 “ primum ex contusione tumore, cui a barbi-
 “ tonfore sanato, superstes fuit fistula inter
 “ utrumque annulum asperæ arteriæ, cum læ-
 “ sione utriusque cartilaginis, ex qua spiritus ef-
 “ flabatur.” Having first prepared him (he says)
 “ Deveni ad topica; et primo quidem quatuor

“ integumenta dilatavi turunda ex spongia,
 “ deinde *scalpro abrasorio partes ipsas carti-*
 “ *lagineas utrinque læsas accurate abrase*, tum
 “ filamenta arida supra easdem applicui; post
 “ modum unguento iridis, quod occalescere
 “ coeperat, in parte carnosâ attrivi. Tandem
 “ globulis ex filamentis, imbutis unguento ex
 “ tutia, cavitatem oppleui; atq; sensim et sen-
 “ sim imminutis globulis, cerato ex diachalci-
 “ tide, cum filamentis aridis cicatrice fistulam
 “ obduxi.—Vide Marchettis Obs. Medico.—
 Chirurgicar. Ob. 37, p. 52.

In imitation of the above method I slightly (every other day) scratched the edges of the wound in the trachea with a scalpel, dressing it up with dry lint and a retentive bandage, going on thus for about three weeks, I had the pleasure to see the opening contract apace, when my patient, in the absence of her nurse, and undesirous of living, accomplished what she had before miscarried in, (the destroying herself) by giving herself a second wound, and dividing the left carotid artery hereby depriving me of the expectation I reasonably had of succeeding in the cure.

The ingenious Dr. Muzell, author of some medical and chirurgical cases, which occurred to him in the Charité at Berlin, assures us, that he had seen the good effects of scarifica-
 tion

tion in much the same manner, in many cases, particularly ulcers of the velum palati, and fistulæ in perinæo——Patience and a constant repetition of the scarification is required; for it is difficult to touch all the parts with the lancet, and they do not heal, till they become raw and inflamed; he further says, that he once saw this method prosecuted with success in a disorder of the nose, where there was a considerable aperture in the cartilaginous part of the left nostril, which, after a long continuance of the scarification, was cured. He directs that the incisions should always be made as near as possible to each other, and to be repeated twice a day till the callosities are gone, and equal granulations of flesh appear.

Upon the facility with which even some of the most complicated wounds of the trachea arteria have been cured, bronchotomy has, both by the antients and moderns, been principally established.

Sometimes extraneous bodies are so engaged in the æsophagus, that we can neither extract nor depress them. And this happens when the extraneous body is of a considerable bulk, and compresses the trachea arteria to such a degree, that the patient is in imminent danger of suffocation.

Habicot (*Question Chirurgicale sur la Bronchotomie* cap. 16.) in this extremity insists upon the operation being performed as it ought to have been (says he) on him, who on a festival day, swallowed a small bone of a leg of mutton, which remaining in his pharynx, suffocated him in the presence of the physicians and surgeons, who did not relieve him by this method.

A boy swallowed nine pistoles wrapt up in a linnen cloth, in order to hide them from robbers, but this bundle being too big, stopped at the narrowest part of the pharynx. He was almost suffocated from the pressure made on the trachea; his neck and countenance was so inflated, that his acquaintance did not know him. Habicot, seeing him in such danger, and not able to dislodge it, performed bronchotomy upon him; this was no sooner done, than the inflation and livid colour of the neck and face disappeared. And he made the parcel descend into the stomach by means of a whalebone probe. Eight or ten days after, the patient at different times, discharged the nine pistoles by stool.—This operation may also be of another use than to make the patient respire, and which Habicot does not mention, and that is to open a passage for the extraction of bodies which slip into the trachea, and are engaged in it.

Haller tells us in his *Pathological Observations*, that he dissected a boy who had been suddenly choaked by a filberd, which had stuck below the glottis, under the inferior ligaments, below the thyroide cartilage, immediately above the orifice of the aspera arteria. This misfortune, says he, might probably have been prevented by bronchotomy, if, when the accident happened, the asperia arteria had been immediately opened, and so the fatal nut taken out with a spoon.

The following case, though not relievable by such an operation, I mention only as a very extraordinary instance of suffocation, from the same author—A girl of ten years of age, and whose only complaint was worms; in dissecting her, he found the mouth and throat quite full, two of which he also found in the aspera arteria, near the seat of the heart, and at the beginning of the lungs.

Our countryman Willis seems to have been the first, who in such cases thought of performing the operation of bronchotomy—Willis being once opposed in a case which required it, the patient died, and he afterwards performed it in the presence of those who were against it, and very easily extracted a long and triangular bone.

Heister tells us, that he performed it on a young man, by making a longitudinal incision, upon the trachea, and then cut through four or five rings longitudinally, and took out a mushroom.

We are also told, that Rauu opened the trachea, in order to extract a bean, which had slipped into the larynx.

The observations are so many, which might be adduced to prove the safety of the operation, (and if an operation so considerable has been performed with success in a swelling and inflammation of this part, it must succeed much more surely, when it is performed on a sound part, whose functions are only interrupted by the presence of an extraneous body) that we must necessarily impute the death of such patients, to the timidity of those called unto their assistance.

Verdue assures us, that this operation was in his time successfully performed by a surgeon, who was so dexterous, as to extract by it a small bone through the opening, after which, the wound of the trachea was soon cured. Without this speedy and bold operation, continues he, nothing but death could have been expected.

Let this serve us as a caution on similar occasions, and let us not be so cowardly and timorous, as to let a patient die without assistance; for in cases of necessity every thing is to be risked.

We now and then meet with wounds of the throat, through which the food escapes; we are not for this reason always to suppose, that the *æsofagus* and *trachea* are wounded—These wounds passing sometimes only between the *glottis* and root of the tongue.

Young surgeons should know, that a considerable and sudden *emphysema* is an occurrence not unusual in penetrating wounds of the *trachea*, and this happens when the wound is very small, or that in the *trachea* is not opposite to that of the integuments; owing to which it is that the air insinuates itself into the cellular membrane, not only of the neck, but the head, breast, belly, scrotum, and even the upper and lower extremities, an instance of which I lately saw.—I shall say more of this symptom under my reflections upon the lungs.

The bronchial glands are of various sizes, some larger, some smaller; they are of a blackish colour, and are connected by a cellular substance to the lowest part of the *trachea*, and to the divisions of the *bronchia*, and are supposed

posed to communicate by small openings with the cavity of the bronchia.

The bronchia have their origin from the trachea, and are first divided into branches afterwards subdivided again, and into almost innumerable ramifications: they finally terminate in those small cells or vesicles, which form the greater part of the substance of the lungs.

In two or three bodies dying of peripneumonies, Dr. Haller found these cells loaded with blood, that a great part of the lungs were become quite black, and though the lungs naturally swim when put into water, these on the contrary sunk, wherefore, he concludes, that it is not in the vessels only that the blood of persons in a peripneumony is congested, but that there is a true error loci; and that the blood exhales into the vesicles of the lungs, instead of that subtle vapour with which they are naturally moistened.

Hence we are able to derive a truer idea of the nature of inflammations in general; and that the blood in such cases is not alone shut up within the vessels of the inflamed part, but that there is an effusion of it also into the cellular membrane.—This new, or rather revived theory of inflammations (for he is so candid as to say, *Hæc est antiquissima inflammati-*
onis

tionis theoria, quam Galenus proposuit) he has beautifully confirmed by instances deduced from some particular cases of surgery, and which you will meet with in the first volume of his *Elementa Physiolog.* and further illustrated in his *Pathological Observations*.

All the bronchial cells are surrounded by a very fine reticular texture of the small extremities of arteries and veins, which communicate every way with each other.

The blood vessels of the lungs are of two kinds; one common, called the pulmonary arteries and veins; the other proper, called the bronchial artery and vein.

The pulmonary artery goes out from the right ventricle of the heart, and its trunk, having run almost directly upwards as high as the curvature of the aorta, is divided into two lateral branches, one called the right, the other the left pulmonary artery.

The right artery passes under the curvature of the aorta, and is consequently longer than the left. They both run to the lungs, and are dispersed through their whole substance by ramifications nearly like those of the bronchia.

The pulmonary veins, having been distributed through the lungs in the same manner, go out on each side by two great branches which open laterally into the reservoir or muscular bag of the left auricle. These three orders of vessels, with their course and numerous divisions, will best be understood by seeing some preparation of them.

Besides these capital blood vessels there are two others, called the bronchial artery and vein by Ruysch, who described and gave them that denomination, because creeping or spreading upon the bronchia, they are extended even to their extremities.

The great vessels appear destined for the circulation of the blood through the lungs. The bronchial vessels are supposed to serve for their nutrition. For it appears to be a constant rule of nature, that the viscera, which change by their fabric the common humours brought to them for the use of the whole body, have still other arteries peculiar to themselves, which bring the vital blood appointed for their nutrition.

The lungs are the principal organs of respiration—hereby it is that parts noxious and redundant are exhaled from the blood, and there-

therefore not improperly defined by some the pulmonary transpiration.

Respiration is also necessary to facilitate the passage of the blood through the lungs, by which means it has the cohesion of its parts broken, attenuated, and pounded as it were. And it is by this force, that the abdomen with all its viscera are continually compressed. By virtue of this, the stomach, intestines, gall-bladder, receptacle of the chyle, urinary bladder, intestinum rectum, and the uterus itself, discharge their contents; and by this action, the aliments are principally ground or dissolved, and the blood is urged through the sluggish vessels of the liver, spleen, and mesentery.

We should scarce believe that part of the vital viscera might be amputated when they are exposed by wounds, if it was not proved safe by experience.

We read in Tulpius of a man who received a large wound under his left breast, part of the lungs on that side protruded through the wound, to the breadth of three fingers, which being neglected, begun to mortify, a ligature was immediately made round it, and then cut off with a pair of scissars, to the quantity of about three ounces, in fourteen days the wound

was healed, and the man survived for six years afterwards.

Hildanus likewise certifies, that part of the lungs being prolapsed through a wound of the thorax, it was afterwards cut off with a hot instrument of steel, the patient being afterwards cured.

Nay Celsus formerly boldly pronounced, *Si quid aut ex jecinore, liene aut pulmone duntaxat extremo dependeat, id præcidatur.*

Ruyfch tells us, (ob. 53.) that a servant being wounded in the bottom of the fore-part of the thorax into its cavity, a surgeon was called, who seeing something thrust out of the wound, immediately made a strong ligature about the whole part that was expelled, thinking it to be a portion of the omentum, and immediately sent for him into consultation; but upon hearing him say that the wound was not inflicted in the abdomen, but into the cavity of the thorax, and that the part thrust out, which he had tied with the ligature, was a portion of the lungs, he stood like one astonished. Things being thus stated, Ruyfch advised him to leave the wound as it was, till he found that part of the lungs intercepted by the ligature mortified, hoping that
it

it would be then separated, and the remainder of the lungs healed in the wound itself, which so happily succeeded, that the patient was cured in a little time after.

There is a symptom which is sometimes an attendant on penetrating wounds of the breast and lungs, and of so extraordinary a nature, that it will be inexcusable not to take notice of it. It is the emphysema, or that amazing inflation which arises from the air vessels of the lungs, being injured by the wound, so as to deposit their injured air into the cavity of the thorax. It appears from medical observations, that the air having entered the cellular membrane may pervade almost all parts of the body, and produce wonderful tumors, especially as these cells are every where open, and form one continuous cavity throughout the whole body, so that none of the cellular fabric is excepted from this communication, nay even the vitreous body itself of the eye has received the flatus of an emphysema. We meet with (in the *Academ. des Sciences*) the history of a man who was wounded into the thorax, and who, before his death, had his whole body surprizingly swelled with one of these kind of tumors, excepting the soles of his feet and the palms of his hands; upon the thorax the tumor was eleven inches thick, and upon the abdomen nine, the eyes in this subject

subject were in a great measure thrust out of their orbits, from the cellular membrane being distended with a great quantity of air.

There is another case of this kind in the same work, of a fatal emphysema, from a fracture of the ribs, the skin remaining entire.

Wherever such inflations are found, the curative indication directs to discharge the elastic matter from the cellular membrane which it distends.—Parey gives us a fair instance of the success of scarification in a case of this nature. For while the miserable patient was given over by every one, a skilful surgeon (he says) boldly perforated the skin with a great many very deep scarifications, and thereby discharged the included air, so that the patient was restored to his health, and in a manner snatched from death.

The like tumors arise from a putrefaction of the extravasated humours, since it is evident from experience, that putrefaction will produce or extricate the elastic matter which lay concealed in bodies, and which, if it is not real air, has at least the same elastic power, by which it will expand greatly by heat.

The air dilating itself in the blood after death occasions various motions. Haller says, that

that he has seen the blood in the heart of a young man filled with air, to resolve itself into froth and to discharge itself from the opening he made in the heart. He adds, that he has also seen the blood discharge itself from the mouth of a very fine woman who died in child-bed, so as to fill the shroud.

There are many cases of this nature; and perhaps this is the only cause of the bleeding in dead people, which the superstition of the ancients hath regarded as an index of divine vengeance, which discovered the criminal by this bleeding his presence had created in the body of the person he had deprived of life.

To return to our reflexions upon the lungs—Should a large abscess in this part break suddenly, so that the matter cannot be discharged slowly, and in a small quantity at a time, by coughing, but vents itself at once in a violent flood into the windpipe, so as to fill it, there will be no passage left for the admission of the air; whence sudden death.—I saw two unhappy instances of this not long since.

Sometimes the abscess bursting, the matter falls into the cavity of the breast, and this with a fatal event, unless there is a passage
made

made for its discharge by a timely aperture into the thorax.

Boerhaave saw, he tells us, in the body of one who expired of a suppuration in the thorax, that the lungs on one side were converted into a sack-full of matter, of such a prodigious bulk, that it not only displaced the heart from its situation, and compressed the lungs into a small compass, but likewise thrust down the diaphragm, and made it protuberate into the abdomen.

Haller likewise saw a most terrible disorder of this part, in a body which he opened—The lungs on the left side were not to be found, but instead of them, a large quantity of matter; the aspera arteria (which if himself had not seen, he should scarce have believed) and the larger arteries and veins opened with wide orifices into the cavity of the thorax, as if they had been cut through, so that it was very hard to discover what it was that prevented the efflux of the blood.

As the lungs from an inflammation often adhere to the contiguous parts, the abscess may break outwardly; which would prove a good effect, though from a bad cause.

We are taught by morbid dissections, that the matter has eat through the diaphragm, and even into the stomach itself; I have seen where it has got from the lungs through the diaphragm and into the liver.

Though the principal seats of calculi are the urinary or gall bladders, yet history shews us, that scarce any part of the human body are excepted from stony concretions, not even that organ we have now been describing.

The great Boerhaave relates, that the famous Botanist Vaillant spit up four hundred stones from his lungs, and that he has seen asthmas of the worst kind, where calculi have been brought up from the windpipe, when the respiration would be free till more calculi were formed.

Kerckringius (in his *Spicelegium Anatom.*) has a case of this kind to which he has subjoined the figure of the calculi adhering to the bronchia.

Le Dran tells us, that he knew two instances, where they were often discharged by expectoration.

There still remains another interesting remark to make upon this part. Every one has

M

heard

heard of the experiment upon the lungs made to discover whether an infant has died before or after the birth.

It is the common opinion, that to be convinced of the truth in this case, we ought to put a piece of the infant's lungs into the water, and if it swims, it is a proof that it has breathed, and consequently been alive.

Though this experiment appears convincing to absolve or condemn persons accused of destroying their children, yet it is proved, by many facts, that it is not so infallible as it is imagined.

The lungs of a child, dead before its birth, sometimes swim in water. This happens when, immediately after its birth, we blow into its mouth, as sometimes midwives do, when they doubt whether the child is really dead.

We meet with an example (in the Norimberg Transactions) by a physician; where, he says, the child was certainly born dead, whose body was not dissected, till it was considerably putrified; its vessels were full of air, and vesicles, distended with it, were seen on the lungs; pieces of the lungs swam when put into water.

Hence

Hence we may see how great the uncertainty of this experiment is, and how cautious we ought to be, when we examine the bodies of infants, in order to make a report to a court of judicature: upon this head, *see Bobnius, de renunciatione vulnerum, dissert. de infanticidio, pag. 171.*

F I N I S.



111

There is a great deal of work to be done
in the way of the people of the world
and it is the duty of every one of us
to do our part in it. We must not
be idle, but we must be active.
We must not be selfish, but we must be
generous. We must not be afraid, but we must be
brave. We must not be lazy, but we must be
industrious. We must not be dishonest, but we must be
honest. We must not be unkind, but we must be
kind. We must not be unclean, but we must be
clean. We must not be ungodly, but we must be
godly. We must not be unloving, but we must be
loving. We must not be unfaithful, but we must be
faithful. We must not be unrighteous, but we must be
righteous. We must not be unmerciful, but we must be
merciful. We must not be unkind, but we must be
kind. We must not be unclean, but we must be
clean. We must not be ungodly, but we must be
godly. We must not be unloving, but we must be
loving. We must not be unfaithful, but we must be
faithful. We must not be unrighteous, but we must be
righteous. We must not be unmerciful, but we must be
merciful.

112

89
9

A
T R E A T I S E
O N T H E
N A T U R E and V I R T U E S
O F
B U X T O N W A T E R S.

W I T H
A Preliminary Account of the External and
Internal Use of Natural and Artificial
W A R M - W A T E R S among the
A N C I E N T S.

By a P H Y S I C I A N.

*Homo Naturæ Minister et Interpres, tantum facit et intelligit,
quantum de ordine Naturæ opere vel mente observaverit.*
VERULAM.

L O N D O N :

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M.DCC.LXI.



T H E

P R E F A C E.

HAVING had occasion to go to *Buxton* last summer on account of my health, I took the opportunity of examining the nature and virtues of the waters, more for my own private satisfaction, than from any intention of communicating my observations to the public. I have since read over what has been wrote upon them by different Authors, but finding little satisfaction in any of them, I was induced to extend my notes and observations to the size they now appear in. I have not the vanity to think
my-

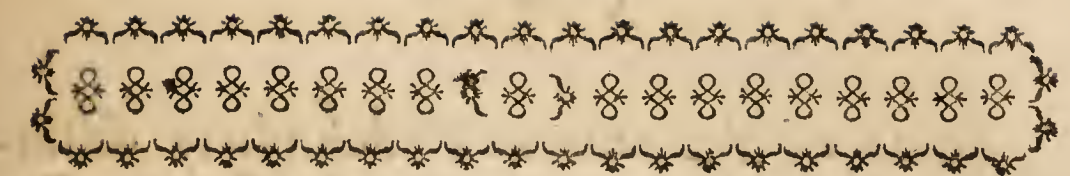
P R E F A C E.

myself capable of enumerating all their virtues; my short acquaintance with them makes such an attempt impracticable: I am therefore only desirous of being thought to have contributed somewhat towards pointing out their virtues, which are many; and remain in hopes that some time or other a person of greater abilities will think them worthy of his attention. I am sensible that my bare opinion would go but a little way in determining the judgment of my readers, for which reason I have in most places given my authorities, that they might share the censure or approbation of the public with myself. The language, I hope, will be found sufficiently clear to convey my sentiments: I am conscious of its defects in point of elegance, and am therefore only solicitous about its perspicuity.

P R E F A C E.

It is hoped the Author's distance from town will plead in his behalf for the errors of the press ; as to the other faults, which are of a more tender concern, he is sensible they must be left to the candor of the Public.





A

T R E A T I S E

ON THE

NATURE and VIRTUES

O F

BUXTON WATERS.

C H A P. I.

Natural History of Warm-Waters.

I BELIEVE I may venture to lay it down as a general Rule, that there are few Diseases incident to the human Body which may not be either palliated or totally removed by the judicious use of water, considered according to the nature of the distemper, either as pure and elementary, or saturated with principles of different qualities.

B

Some

Some of the antient Philosophers distinguished the element of water by the appellation of *Omniseminaria*, or seminary of all created things. *Diogenes Lærtius* informs us, that *Thales* the *Milesian* was the first who taught this doctrine, and since his time a few of the moderns have in some degree adopted his system. *Agricola* tells us, that not only stones, but also several sorts of fossils and metals have been discovered in a soft and yielding state; and from thence concludes, that water is the original Basis of every natural Production. If we examine the embryo state of nature, we shall find a good deal of truth in this observation. The hardest bones of animals were once a soft Jelly, and the hardest grains and seeds were once a drop of viscid water inclosed in a tender pellicle. *Milton* perhaps alludes to this Philosophy of *Thales*, when he says,

—— on the watry calm

His brooding wings the Spirit of God outspread,
And vital virtue infus'd and vital warmth,
Throughout the fluid mass. ——

Pure spring water has the appearance of an homogeneous fluid; but upon examination we find it heterogeneous, containing
salts

prodigious number of marble statues, figures and vases of the best masters. The Emperors took particular pleasure in collecting in these places most of the excellent pieces of painting and sculpture, which the *Romans* had brought to *Rome* from the principal cities of *Greece* and *Asia*. These, with the striking grandeur of the architecture, the beautiful and stately pillars, the curious vaulting of the roofs, and the number of spacious apartments, serve conspicuously to show the riches, grandeur and elegance of the *Roman* Emperors.

Thus much for the general account of the antient Baths, the truth of which is well attested from concurring Testimonies of antiquity; but as to the parts immediately subservient to bathing, I confess I have found them but very imperfectly described both by the antients and moderns. *Vitruvius*, among the antients, has given us their structure, but after reading him ever so carefully, you will find great difficulty in reconciling what he says, to the opinion of some others upon the same subject. Father *Montfaucon*, in his *Antiquities*, has given us a fine view of the internal structure of an antient Bath, from a painting found in the *Thermæ* of *Titus*, which represents all the parts very distinctly.

According

According to *Vitruvius*, the place set apart for bathing consisted of six rooms, which had a ready correspondence from one to the other. There was first the *Frigidarium*, where they undressed and rubbed, then the *Tepidarium* or warm room, where they remained until the pores of the skin were gently opened; from thence they went into the *Laconicum*, which was some degrees warmer, and after staying there a short time, they went into the *Sudatio*, or sweating room, where they were rubbed, and sometimes anointed with oil; from thence they went directly to the hot Baths. The floors of these hot rooms were hollow to receive the heat of the Hypocaustum, which was a large furnace underneath, supplied with wood, the heat of which was communicated to the stoves by means of the vacuity. The same furnace also heated another room, called *Vasarium*, situated near the stoves, wherein were placed three large vessels called *Milliaria*, by reason of their capacity, one for hot water, another for warm water, and the third for cold; being so contrived, that the waters might be readily distributed by pipes and cocks into the neighbouring Baths, according to the occasion of the Bathers.

salts of different kinds and a portion of earth ; principles not to be separated from it without extreme violence. Mr *Boyle* endeavoured to separate water from its earth, by repeated distillations, but after distilling it a hundred times over, it still continued to deposite some earthly particles ; from thence he justly concluded, that there was no such thing in nature as pure and elementary water.

Providence has in every part of the world, abundantly supplied its inhabitants with this necessary element, without which neither animals, vegetables, or minerals could be supported ; and though in some places it is found to spring from the earth in small quantities, yet we find the defect abundantly supplied in rain and dew. However, in most places it flows plentifully in springs from the bowels of the earth, sometimes in pure elementary streams for the common support of living creatures ; at other times it carries with it principles of a medicinal nature, according to the soil it passes through.

There is perhaps no nation entirely destitute of these medicated springs : but as I do not propose giving a general history of them, I shall only enumerate those of the warm
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kind,

kind, as taken notice of by different Writers. These are extremely common in almost every part of *Europe*, particularly in *Italy*, the kingdoms of *Naples* and *Sicily*, and appear most numerous in the neighbourhood of subterraneous fires and volcanos. In *Tuscany* they enumerate upwards of forty hot springs, in *Germany* near fifty of great note, in *Hungary* nine, in *Poland* more, in *Spain* above forty, in *France* a great many, in *Great Britain* a few, and even in *Iceland* and *Greenland* there are several hot Springs. *Asia* and *Africa* are reported by travellers to abound with hot waters; and in *America* they are very common, especially in *Mexico* and *Peru*.

The heat of all these waters is various in degree, from the temperate ones of *Buxton*, *Bristol*, and *Mallow* in *Ireland*, to the hot ones in *Iceland*, which are said in a quarter of an hour to boil a large piece of beef *.

Philosophers have differed very much in their opinions about the cause of heat in these waters, but I do not find that any of them have as yet been able to lay down an hypothesis, which is not liable to many objections.

* *Lowthorp's Abridgment of Philosophical Transactions.*
Page 609.

objections. The attempt, no doubt, is truly laudable, as it is a philosophical enquiry, tending to investigate the hidden nature of things; but I am afraid they will never be able to arrive at any more certainty about it, than they have hitherto done. It is, no doubt, useful to know the different Strata through which the waters pass, but to conclude them hot or cold, because they run through particular earths, is certainly too presumptive. *Hoffman* says, that water passing through beds of the Pyrites Aureus becomes warm, but we know of waters absolutely cold which run through the same kind of substance. It is indeed true, that the Pyrites, when laid in heaps and watered, becomes warm, and emits a great deal of smoke; but to conclude from thence, that the heat of Baths proceeds from the like process in the bowels of the earth, would be saying in other words, that all hot waters pass through beds of the Pyrites, the contrary of which is well known. Again, if the Pyrites was the cause of heat, I do not understand how this heat should continue uniformly the same for so many ages, for when once the Pyrites is heated by water, as in the experiment upon it in the open air, it becomes decomposed, and the heat soon after ceases. Now unless

there should be a constant succession of fresh Pyrite in those meanders through which the waters pass, I cannot conceive how this heat should be kept up so long, and with such an equal temperature; and we know it would be absurd to suppose such a regular succession. What then occasions this heat in warm waters? I confess I know not. However, it is a singular happiness, that the point in dispute does not seem to be any great obstacle to our forming a true judgment of the virtues of medicated waters. *Hoffman* was not the first who ascribed the heat of mineral waters to this cause. *Berger* and *Lister*, had done it before him, and I am told most of our present Analysts are advocates for the Pyrites.

The common experiment of mixing steel filings with sulphur and water, which in a few hours grow exceeding warm, and in time emit sulphurous flames, has induced many naturalists to imagine a combination of these two common principles to be the cause of heat in all warm springs. For my own part, I am inclined to think, that if the mixture of sulphur and steel was the constant cause of heat in these mediated springs, we should always find them
greatly

greatly faturated with these principles. Now we undoubtedly know, that the waters of *Bath* in *Somersetshire* contain but a small portion of steel, and nothing of what really deserves the name of sulphur; and those of *Aix la Chapelle*, though they contain sulphur, give no signs of steel; yet both of these are found to issue warm from the earth, and retain their native heat a considerable time. Again, it is well known that the *Geronsterre* water, though impregnated to a considerable degree both with iron and sulphur, is, notwithstanding, remarkably cold.

If we carefully examine all the principles impregnating hot waters, we shall find them so very different in different springs, and so little proportioned to the heat in each water, as makes it very unreasonable to deduce the cause of heat from the Quality of their respective minerals. If we could but once clearly demonstrate the cause of subterraneous fires and volcanos, we might then, very probably, reason with more certainty upon the present enquiry; for it is commonly observed in *Italy*, the kingdoms of *Naples* and *Sicily*, that there are several warm springs near to the places where the terraneous fires break out into flames and

fmoak : and in that part of *Bohemia*, where the *Caroline* Baths arise, there were formerly eruptions of fire from the earth, as *Agri-cola* and *Balbinus* testify ; and *Hoffman* tells us, that the earth in that neighbourhood was in his time warm, in many places, to the touch.

The Chymical examination of mineral waters has for this last century been much attended to and certainly a competent knowledge of the component parts of any heterogeneous substance must assist greatly in establishing its virtues on a reasonable foundation. *Hoffman*, whose great abilities in physic, as well as chymistry, every one is acquainted with, was among the first who gave us a just and true analysis of mineral waters. Before his time, it was usual to attribute their virtues to gold, silver, quicksilver, tin, lead, &c. as appears from the learned *Andreas Baccius*, in his book, *De Thermis*; and upon these erroneous data they raised hypotheses, the absurdity of which are abundantly exposed in his learned and laborious account of mineral waters.





C H A P. II.

The Opinion of the Antients on the external Use of Natural and Artificial Warm-Waters.

THE custom of bathing in warm water, whether made artificially so by heat, or flowing naturally from the earth, appears to have been very antient, but we do not find that it was used so early with a design to remove diseases. Warm Baths were in great repute among the eastern nations, such as the *Medes*, *Persians*, and inhabitants of the lesser *Asia*, but very probably were only used at first as purifiers of the skin from dust and sweat; inconveniences to which those nations, from the warmth of their climate and manner of dress, must have been greatly liable. Luxury in a little time made them still more frequent, and we find that *Zenophon* in describing the luxurious manners of the *Persians* and other *Asiatics*, calls them *Balneatores*, *Pocillatores*, &c. In the time of *Hippocrates*, we find that bathing in natural springs of warm water, was recommended with

with a medicinal intention ; and perhaps this is the most early authority we can produce of their use in medicine. In the fifth book of his *Epidemics*, he tells us of a person who was cured of an obstinate cutaneous disease by bathing in a certain warm Spring, but that afterwards he fell into a dropfy and died ; and in his second book *De Diæta*, he says a great deal of their use in medicine. *Plato* recommends their use in several diseases of the body, as well as for their admirable faculty of restoring strength and vigour to bodies worn out by hard labour. *De Legibus, Lib. VI.*

Aretæus, who seems to have been prior to *Galen*, prescribes the warm sulphureous Baths in the cure of the *Elephantiasis*, and on account of their relaxing property recommends them very much in the cure of melancholy. *Galen* in many places takes notice of the admirable effects of warm bathing in the cure of diseases, as abundantly appears in his Treatise, *De Temperamentis* ; and in *Method. Med. Lib. X. Cap. 10.* he gives us very particular directions for bathing patients emaciated by a hectic fever.

Homer, in the twenty second *Iliad*, commends one of the fountains of *Scamander*, for its hot waters : and in the same *Iliad*,
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Andromache provides a hot Bath for *Hector* against his return from the battle. *Nestor*, in the eleventh *Iliad*, orders *Hecamede* to make ready an hot Bath; and to mention but one instance more from this celebrated Poet, the *Phœaceans* are said somewhere in his *Odysssey*, to place their chief delight in changes of apparel, hot baths and beds.

A great deal more of the practice with respect to bathing in natural and artificial warm waters may be seen in the works of *Cælius Aurelianus*, *Oribasius*, *Aëtius*, *Alexander Trallianus*, and *Paulus Ægineta*.

We do not find from any part of history, that the *Romans* made use of either natural or artificial warm Baths, until after they became acquainted with the *Greeks* and *Asiatics*, among whom warm bathing, as I have observed, was carried to great excess. At first the rich established Bagnios in their own houses, for the convenience of themselves and visitors; but in a little time we find the custom of bathing so very prevalent, that it was looked upon to be as essential to health as nourishment itself. Hence we find the state provided Baths for the use and convenience of the poorer citizens, where they
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had the liberty of bathing at a small expence; as we learn from *Horace*,

Dum tu quadrante lavatum

Rex ibis. —

Lib. i. Sat. III.

Agrippa, in his *Ædileship*, is said to have built upwards of one hundred public Baths. After his example, *Nero*, *Vespasian*, *Titus*, *Domitian*, and most of the Emperors who studied to gain the affections of the people, erected public Baths, laid with the finest marble, and built according to the rules of the most delicate architecture. At the first institution of private Baths among the most wealthy citizens, we do not find they studied elegance and magnificence, so much as use and convenience; but as soon as the *Roman* conquests became considerable, and the practice of pillaging the provinces began, we find they altered the original plainness and simplicity of their Baths, and vied with each other in the elegance and grandeur of them. Of these the Poet *Statius* says,

*Nil ibi Plebeium, nusquam Temesæa videbit
Æra, sed argento felix propellitur unda,
Argentoque cadit, labrisque nitentibus instat
Delicias mirata suas, et abire recusat.*

The most superb Baths, however, were far remote from the beauty and extent of those called *Thermæ*, which were almost all built by the Emperors for the public use, in which their principal view seems to have been to display their magnificence, having spared nothing that could give an high idea of it. For we find they were spacious and magnificent edifices, adorned with porticos and galleries, of extraordinary extent and superb architecture, which contained not only Baths, but every thing else that could render them agreeable.

There were places allotted in them for all manner of bodily exercises, such as leaping, running, wrestling, throwing the discus, &c. and even those of the mind, as it was customary for the Rhetoricians and Philosophers to assemble under the porticos to teach the youth Rhetoric and Philosophy. They also contained libraries, where the studious were wont to repair, witness the famous *Bibliotheca Ulpia*, which had been placed by the Emperor *Trajan* in the *forum Trajani*, but afterwards removed to the magnificent Bath of *Dioclesian*.

It may not be improper to observe, that at these places people met to discourse of
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the news of the city. Hence we may understand the reason why the Poets gave them the epithet of *Garrulæ*; works of wit and humour were frequently read there, as we understand from *Horace*.

—— *In medio qui*

Scripta foro recitent, sunt multi; quique lavantes.

Lib. i. Sat. IV.

The *Thermæ* of *Dioclesian* and *Caracalla*, were the most extensive and remarkable of any built by the Emperors, great part of which is still remaining, making one of the greatest curiosities of modern *Rome*. It appears to have been these to which *Ammianus Marcellinus* alludes, when he says, the *Romans* had Baths as large as provinces, *Lavacra in modum provinciarum*. *Lipsius* assures us, that those of *Caracalla* were so large, that two thousand people might bath in them at the same time; and we are told, that no less than forty thousand Christians were employed many years in erecting the magnificent ones of *Dioclesian*.

The pavement of these *Thermæ* was of marble and mosaic work, and the walls were covered and adorned with paintings of great value: but their principal ornament was the pro-

I must here observe, that the room called *Laconicum* is wanting in the painting above mentioned, and the word is wrote over a kind of furnace: but *Vitruvius* expressly mentions it not as a furnace, but as a sweating room. Some pretend that it was the same as the *Tepidarium*, but I have ventured to proceed upon the authority of *Vitruvius*, who expressly says, that the *Laconicum* and *Sudatio* are to be joined to the *Tepidarium*. *Laconicum Sudationesque sunt conjungendæ Tepidario*. *Vitruvius* V. 10. by which he plainly distinguishes these three places.

The method of bathing was there very different from what is practised at our Bagnios, for they never had their whole bodies immersed in water, unless by direction of the Physician. They usually seated themselves in the Bath on a low seat or stool, called *Solium*, with their legs and sometimes their thighs covered by the water. In the mean time, the water, tempered according to their inclination, was poured upon their heads and shoulders by slaves, from urns made for that purpose. Their bodies were well rubbed with a sponge, and scraped with a crooked instrument called a *strigil*; after which operation, they repaired back again to the *Sudatio*, where they remained a

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short

short time, and passing through the *Laconicum*, they went into the *Tepidarium*. From thence they repaired to the *Frigidarium*, where they generally received a sprinkling of cold water, after which they were conducted into a room called *Elæothesium*, where they were wiped dry, and anointed with perfumed oils, and dismissed from the Baths to supper.

The vessel in which they bathed, seems only to have been contrived to receive one person at a time, and was either of Marble, oriental Granate, or Porphyry, though of an extraordinary size, as may be judged from those which have been found in the ruins of those buildings; most of which serve at this day for the public fountains in *Rome*. Besides these large bathing vessels, there were large basons full of water for such as desired to exercise themselves in swimming; so that nothing was wanting that could add to the grandeur of the founder, or contribute to the health or amusement of the citizens.

At the first establishment of public Baths, there were distinct ones for the men and women, but in a little time they became common, with this difference, that each was waited on by slaves of their own sex.

Adrian,

Adrian, perceiving the indecency of this custom, published an edict, prohibiting the promiscuous bathing of the sexes; *Marcus Aurelius* did the same; but *Heliogabalus* suppressed those ordinances, which were again revived, but with little success, by *Alexander Severus*: So that this indecent custom subsisted a considerable time, even among the Christians, notwithstanding the many remonstrances of the ministers of the church, and was not entirely abolished till after the time of *Constantine* the Great.





C H A P. III.

The Opinion of the Antients on the internal Use of natural Warm-Waters.

HAVING thus given a short account of the antiquity of warm bathing, I shall next examine into the opinion of the antients concerning the internal use of medicated waters ; and in this examination it will be necessary to take notice of what they say concerning the cold springs, as well as those which are hot.

Strabo, in his fifth book, makes mention of several cold springs which were serviceable when drank, as well as bathed in ; and *Athenæus* tells us of a fountain in *Paphlagonia*, which had an inebriating quality, to which many of the inhabitants of the country frequently resorted *.

Vitruvius has a whole chapter on warm and cold springs, wherein he describes their
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* *Deipnosoph.* Lib. 2.

medicinal virtues when taken internally. He says, that bituminous waters are of great service in many disorders of the body ; and in many other places he abundantly shews that the internal use of medicated waters was not unknown among the antients.

Scribonius Largus, who lived in the reign of the Emperor *Claudius*, recommends the use of warm water in which steel has been quenched, in several diseases of the bladder ; and says, that he learned this practice from observing the good effects of a certain chalybeate spring, famous for curing diseases of the bladder.

Seneca, speaking of warm and cold medicated springs, has these remarkable words, *Quædam enim oculos, quædam nervos juvant, quædam inveterata et desperata a medicis vitia percurant. Quædam medentur ulceribus, quædam interiora foveant potu, et pulmonis ac viscerum querelas levant. Quædam supprimunt sanguinem. Quæst. Natural. Lib. III. Cap. i.*

The waters of *Spa* are certainly very antient, for *Pliny* takes notice of them, and particularly mentions the chalybeate taste which they leave on the palate after drinking. *Tungri Civitas Galliæ fontem habet insign-*

nem plurimis bullis stellantem, ferruginei saporis, quod ipsum non nisi in fine potus intelligitur.
 Hist. Natur. Lib. XXXI. Cap. 2.

He also takes notice of a great many other medicated springs in *Italy, Syria, Æthiopia, Greece, France, India, Arabia, Phrygia, Germany*, and other countries ; and bestows a great deal of pains in describing their virtues, as well externally applied, as when drank at the fountain. It is not quite clear, whether ever *Galen* made use of medicated waters in any other manner than bathing, tho' *Le Clerc*, from a very obscure passage is inclined to think he did. *Cælius Aurelianus* recommends the internal use of warm medicated waters, and gives us very distinct directions for their use in many diseases. Those, who are desirous of being more fully satisfied on this subject, may consult the works of *Oribasius, Aëtius, Alexander Trallianus*, and *Paulus Ægineta*.

From all these concurring testimonies, I may venture to say, that the antients were acquainted with the internal use of medicated waters, though from their ignorance of physiology and true philosophy, their practice with respect to them appears very imperfect. Observation and Experience were
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their only guide; the least deviation from which immerfed them in error and fuperftition.

I wifh the memory of fome of our modern Theorifts be not fullied by the improvements of the fucceeding generation. I would not be thought to mean, that the theory of medicine, as it is now eftablifhed, is an ufelefs ftudy; I only argue againft thofe who take it for their only guide, and who are ready at all times to refolve the moft difficult cafes in medicine, according to their preconceived notions of a theory, which perhaps may not be able to ftand the test of half a century. Obfervation and Experience can never miflead us, though I am not entirely for placing my dependence on them: for though the antients made great progrefs in medicine by their affiftance alone, they muft ftill have made a greater, had they been acquainted with fome of our modern discoveries in phyfiology. *Nihil eft quod hæc conjuncta non efficiant, cum interim difjuncta parum profunt.* Keil. Tentamin.





C H A P. IV.

The Virtues of Buxton Waters.

HAVING thus premised a general account of warm waters, with their external and internal use as prescribed by the antients, I shall now begin to examine into the nature and virtues of those of *Buxton* : and first, I propose to ascertain as near as possible their component parts; after which, I shall give an account of the different diseases for which they may be prescribed, as an internal remedy; and lastly, say something upon the warm Bath, with proper observations upon its use, and in what diseases it ought to co-operate with drinking the waters.

From several remains of antiquity which have been observed about *St Ann's* well, we may conclude it was frequented in the time of the *Romans*. Like *Bath* in *Somersetshire*, these waters were probably only used at first for bathing; but at what precise period of time it became customary to drink them,

them, I must confess I have not been able to find sufficient authority to determine.

The soil about *Buxton* is very barren and rocky; and according to Dr *Short*, the waters of St *Ann's* well come immediately from a black lime-stone. The waters are of a temperate heat; but as I had no thoughts of making experiments upon them when I went to *Buxton*, I had not provided myself with a Thermometer, a neglect which I have since more than once been sorry for. Dr *Short* says, they are somewhat warmer than those of *Bristol*, and colder than those of *Bath*; with respect to *Bristol*, he says, they are as 59 to 52, and to *Bath*, as 59 to 90.

I caused four gallons of the waters to be carefully evaporated over a gentle fire, and obtained five scruples of a mixed composition, whereof three scruples were a light blue coloured earth, and the remaining two scruples, by all the trials I could make upon them, appeared to consist of a native alkaline nitrous salt, with about an equal portion of marine salt. I know that Dr *Short*, as well as the ingenious Dr *Rutty*, who seems to proceed upon his authority, calls the salt
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truly nitrous; but I am very confident that the salt in these waters is not so neutral as the common nitre of the shops.

As to the earth, I could not observe any principles in it, either sulphureous or chalybeate, so that I think it may be justly esteemed an inert absorbent earth.

I also tried the waters fresh from the spring, and found them of a temperate warmth, quite clear and transparent, and not in the least betraying any signs of heterogeneous particles to the taste. Upon trial with several sorts of liquors, they gave no signs of steel or sulphur in their composition, nor of any kind of acidity; on the contrary, they raised a gentle effervescence with spirit of vitriol, but that I esteemed more as a proof of their containing absorbent earth, than alkaline salt, which last, as I have above observed, bore but a small proportion to the quantity of containing water and calcarious earth.

The present worthy incumbent of the parish of *Buxton* informed me, that some years ago he evaporated, at the desire of the late Lord *Lonsdale*, about one hundred gallons of these waters down to three quarts, which
were

were sent to *London*, and there chymically examined; the result of which was, that they were found to contain besides earth, marine salt and nitre, a portion of bitumen, which had an aromatic smell, somewhat resembling the balsam of *Guaiacum*. However, I was not able to obtain the least appearance of such an ingredient; neither could I apprehend the least reason to suppose the existence of what Dr *Short* calls impalpable sulphur. I am therefore inclined to think, that the above appearance of bitumen, was merely accidental, as I am informed the waters were boiled down to the state of crystallization in a large kitchen boiler, instead of being slowly evaporated in a clean earthen vessel. If I did not know Mr *Mullard* to be a man of integrity, I should have suspected some artifice in the evaporation; for as *Buxton* waters are chiefly noted for their efficacy in Rheumatic complaints, I should have been apt to suspect some person interested in their reputation, to have added this ingredient during the evaporation. However, I do not propose at present to enter further upon this argument. All I know is, that I could not collect the least appearance of such a bitumen, or of any other substance than is mentioned above.

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The experiments I made upon these waters were conducted agreeable to the directions of the ingenious Dr *Rutty*, in his *Synopsis of Mineral Waters*; but as I have no great opinion of chymical learning in these things, I have purposely omitted a detail of them. I am ready to acknowledge, that the separation of the component parts of any unknown body appears a rational method of arriving at the knowledge of its virtues: but after we have separated the different salts and other principles latent in mineral waters, we shall find, after all our labour, but very slender proofs from whence we dare draw any practical inferences. For a hundred and fifty years past, the waters of *Bath* were supposed to contain sulphur and nitre, but we are now told, and perhaps with truth, that they contain neither; yet notwithstanding this important discovery, we do not find the practice, with respect to them, either altered or amended. Chymistry may assist our enquiries, but experience must determine our opinions; and this observation seems to bear the strongest application, when made to those waters commonly called calcarious, whose principles, every one considered separately, are but very inactive. Besides, it may be proved from reason and
 expe-

experiment, that the constituent principles of most natural bodies, when separated, are found to act upon the human body very differently from what they would otherwise have done, if they had been permitted to remain united by the chymistry of nature.

I am as sensible as any man of the great advantages medicine has received from chymistry within these last fifty years: I do not mean to decry the art, or the professors of it, I only blame them for shewing so much of the Chymist, and so little of the Physician; for if we examine the writers on mineral waters, we shall find in general, near two thirds of their works taken up in experiments and corollaries; as if the practical part of medicine were of little or no service to the community.

Notwithstanding what the chymists may say to the contrary, I am convinced that a just representation of cases, with proper observations upon them, will be found after all to be the most rational method of arriving at the true knowledge of the virtues of mineral waters.

I have

I have therefore endeavoured to avoid what I here censure, by barely mentioning the contents of the waters as they appeared to me from experiments; and by that short method, I have made those pages subservient to medicine, which are usually devoted to chymistry. An exchange, I hope, for the better.

These waters, in common with a great many others, are observed upon first drinking, to affect the head with a sort of inebriating giddiness, attended with a sense of universal fulness and drowsiness; but these sensations, after a few days drinking, go off, and are seldom or never observed afterwards. This quality in waters, does not seem to have escaped the attention of the antients. *Athenæus* and *Vitruvius* make mention of it, and *Ovid* poetically describes it.

*Cui non audita est obscenæ Salmacis undæ
 Æthiopesque lacus? quos si quis faucibus hausit,
 Aut furit aut mirum patitur gravitate soporem.*
 Metamorph. Lib. XV. 317, 321.

This spirit is different in different waters, and in most appears so extreamly fugitive, that it immediately flies off when exposed to the air; and for that reason, all waters must
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be best when drank at the fountain. I am inclined to think, that a great deal of the medicinal virtue of springs, proceeds from the grateful sensation produced upon the tender coats of the stomach by this volatile principle, besides what may arise from its increasing the motion of the blood and forwarding the circulation of the fluids in those vessels which naturally feel but little from the impulse of the heart and arterial system.

This highly volatile and subtilized spirit is most apparent in those waters which are commonly, though improperly, termed *Acidulæ*, and in a small degree is observed in those of the calcarious kind, such as *Buxton*, *Matlock*, *Bristol*, and *Mallow* in *Ireland*. I do not find that philosophers are yet determined in their opinions about the nature of this spirit; some distinguishing it by the name of a volatile mineral spirit, while others suppose it to be the *acidum vagum*, which penetrates all bodies. Some have endeavoured to collect it in the *Bristol* water, by putting it into a retort immediately from the pump, and distilling it without any violence of fire; but I am told, they were not able to obtain any thing spirituous. The *Sieur de Clos* also attempted to separate this principle from the
rest,

rest, by repeated experiments on many kinds of mineral waters, but was in like manner disappointed.

For my part, I do not propose to engage in the controversy among authors concerning the nature of this subtle and elastic fluid, as I look upon it to be only a matter of speculation : it is therefore sufficient that we are able to know it from its effects.

As *Buxton* waters, and those of the calcareous kind, seem to have no visible operation different from common water, except in being a little more diuretic, we may reasonably suppose them to produce their good effects, more by the elementary water which is their basis, than by any other of their principles. I would not be thought to mean that their earth, salt and spirit, are without their use, I only say, that as the contained quantity of these principles is so small in each dose of the waters, they ought to be considered only as assisting the general intention, and not as very active agents in themselves. *Hoffman* tells us, that the waters of *Schleusingen* in the principality of *Henneberg*, are of admirable service in the stone and gravel, gout, rheumatism and scurvy ; yet they are found to contain

contain not the least portion of mineral matter. The same may be said of the Baths of *Teoplitz* in *Germany*; and the waters of *Pfeffer* in *Switzerland*, which appear to be no other than snow water warmed by a subterraneous heat; as also the waters of *Pisa*, *Tetuccia*, *Noceria*, and many others in *Italy*, whose contents no way differ from those which are observed in pure spring or rain water: they are notwithstanding found to be effectual remedies in many diseases. Whence then proceeds their efficacy? Certainly from the elementary water which is their basis.

Pure water, as it betrays neither taste nor smell, must be admirably calculated to correct the acrimonious state of the fluids, from whatever cause it may arise; and if any thing upon earth can be considered as an universal remedy, it must be water.

The subtilty of its parts is visibly shewn in the famous *Florentine* experiment of pressing it through the pores of gold, and from thence we must suppose it very capable of passing thro' the minutest vessels of the body; but in a more particular manner it must be forcing and deterging, when saturated with
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the most subtle principles of different minerals.

Whatever can preserve the minute vessels of the body pervious, and hinder them from growing rigid, must certainly be useful to prevent innumerable diseases, and procure the valuable blessing of arriving at old age without its infirmities; hence we may draw a very good practical inference, for the internal and external use of warm deterging waters.

The blood of a person in perfect health is said to be very mild, betraying neither symptoms of an acid or alkaline nature, but is perfectly neutral, containing salts, somewhat resembling *Sal Ammoniacus* *; however, in many diseases it is known to incline to an alkaline nature, though it is much doubted whether it ever approaches towards an acid; for my part, I am inclined to think it does, and believe that an universal acescency is frequently the primary cause of many diseases, though least suspected. Those people who have long lived on a crude farinaceous diet, and indulged in the free use of fruits of every kind, are constantly observed to have their
bowels

* *Vide Van Swieten, Comm. in Aph. Boerhaav. 60.*

bowels weak and full of wind, which is frequently evident from their sour belchings. Now when once the chylopoietic organs are become weak, and rendered unfit to subdue and concoct their vegetable contents, no wonder they are carried into the blood with a strong taint of their own nature, which is an acid, and so in process of time there is reason to suspect that the blood will become more acrescent than is necessary for the welfare of the individual. It is a common and just observation, that in these people, the bile, which is by nature prone to putrefaction, has become watery and inactive, so that it has little or no power over the acrescent diet. And that this correction of acrescency is one of the material uses of the bile, is evident from the common experiment of mixing bitter herbs with malt liquors, to prevent their growing sour. In some diseases the sweat has been observed to smell remarkably sour; and I remember in myself a few years ago, when I laboured under a nervous disorder, attended with a great inactivity of body and dejection of spirits, that my shirt and bed-cloaths every morning smelt truly acid. *Van Swieten* confirms this observation, when he says, *In morbis languidis aliquando sudor acidum spirans observatur.*

A long and continued use of vegetable acids, is known to melt down the red part of the blood; hence young Ladies who have indulged in the free use of vinegar and other acids, with an intention to keep themselves thin, are frequently observed to fall into a bad habit of body, which is often not to be corrected by the most judicious management. In them we observe an universal laxity and paleness, from the dissolving power of the acids; and as the whole method of cure consists in restoring the broken texture of the blood, and removing the obstructions in the glands and small vessels, there may be reason to expect great advantages from the use of mild alkalescent and absorbent remedies, such as the waters of *Buxton*.

I have endeavoured to shew that the blood may sometimes be of an aciscent nature; and when that is the case, in whatever shape the disease appears, I believe nothing can be of more service to remove it than these waters, if continued a proper time.

Buxton waters are of particular service to people who are subject to bilious Colics, but the patient must be careful to assist them by observing a suitable regimen in his diet,

diet, avoiding all things of a hot stimulating nature, or such as tend to exalt the humours.

They are much recommended in habitual vomitings from too great irritability of the stomach; and in almost every disorder of the stomach and intestines, where gentle absorbent and strengthening things are proper, these may be prescribed with advantage. But as it sometimes happens, they prove too cold upon the stomach at first drinking, they may be corrected by mixing a tea-spoonful of tincture of *Cardamoms* in each dose, until they are brought to agree without its assistance.

In the flatulent Colic they are not much to be depended on, unless assisted by warm strengthening remedies; other waters of a more stimulating quality are therefore to be preferred. They are much recommended in the Fluor Albus, a disease to which women in general are much subject; but in such cases, the warm bath must be absolutely forbid, and the patients, if they chuse to bathe, must use cold water. But as there is no cold Bath fitted up at

Buxton, it will be necessary, to use a tub or any convenient vessel filled with spring water.

Bathing and drinking the waters are of great service in correcting the acrimonious state of the fluids in scorbutic habits, on account of their mild absorbent and diluent quality; and in all kinds of cutaneous diseases they are deservedly esteemed, especially when accompanied with the external use of the waters.

The waters of *Buxton* are found serviceable in the Diabetes, a disease to which old men, and those who have been too free with venereal pleasures, are mostly liable. It is thought by many to proceed from too great a laxity of the secretory organs of the kidneys; but it is abundantly evident that the blood is also vitiated, and whoever does attempt to cure it, by such remedies as immediately brace up the papillæ of the kidneys, unless very recent, will in a little time have reason to lament his mistake. In this disease these waters have a double effect, for they correct the diathesis of the blood at the same time that they strengthen the secretory vessels. At first the patient must drink sparingly of them, lest by their quantity they

they should weaken the relaxed papillæ, which evidently would increase the disease. When the disorder is nearly subdued, and we are certain the blood is reduced to a good state, we may then safely venture upon a course of astringents, such as the peruvian bark, &c.

Gonorrhœas, which have been carried off by a course of drastic purgatives, and mercurials, frequently leave obstinate Gleets behind them, which are most certainly cured by a course of these waters, provided the disease proceeds only from relaxation. The cure will be much expedited by injecting the waters into the urethra by means of an ivory syringe; but if, as it sometimes happens, the acrimony of the matter has eroded the mouths of the small glands, then the method of cure must be different, and little is to be expected from these waters.

There is a Colic which attacks people of a scorbutic habit, and which seems to have its origin from the acrimonious state of the humours. *Buxton* waters are found to be of great service in that disease, especially when assisted with such remedies as tend to correct the impure state of the blood.

In an habitual Cardialgia, commonly called the Heart-burn, they are found to be very useful; but to prevent a return of the disease after the waters are left off, the patient should have recourse to such remedies as strengthen the coats of the stomach.

Those who are subject to fits of the Gravel, frequently find great benefit from these waters, for they mildly deterge the secretory vessels of the kidneys, and at the same time strengthen their tone, which is generally weak in such people, as *Hoffman* very judiciously observes: *Toni renalis nimia resolutio, morborum qui renes occupant, potissima causa et origo est. Qua de causa, temperata astringentia et roborantia, in calculo tam preservando quam curando, palmam cæteris arripiunt.*

I have not any certain proofs of their efficacy in ulcers of the bladder or kidneys, though I am persuaded much good may be expected from them in these diseases.

It is a common and received opinion, that *Buxton* waters are similar in their nature

ture and effects to those of *Bath*; and on that account, many gouty people endeavour to seek relief at *Buxton*, on account of the vicinity of the place to their own habitations: but I am well assured, that there is a most essential difference, both with respect to the drinking waters, and bath; for in these waters we do not find any of the principles sufficiently healing, or of force enough to hasten the formation of the gouty matter, in order to its being thrown upon the extremities; neither are the waters of our bath sufficiently warm to relax the vessels for receiving it when it is formed. I have indeed more than once observed people to have a fit of the Gout during their residence at *Buxton*, but then they were such as had a great deal of it in their constitution, and needed but little assistance to bring it on.

I would therefore advise every person who can afford the expence of so long a journey, and is desirous of having the gouty matter form regularly into a fit, to repair to *Bath*, and not endeavour to obtain at *Buxton*, what may more reasonably be expected in another place.

Though the waters of *Bath* have greatly the advantage over those of *Buxton* in almost
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all diseases, which require a brisk motion of the blood and a powerful relaxation of the solids, they are notwithstanding much inferior to them in the cure of many distempers, as I shall endeavour to show by and by.

Buxton has been, from the most early accounts, famous for the cure of rheumatic complaints; and in several kinds of the palsy, it is deservedly to be preferred to *Bath*, as I shall shew when I come to treat of that disorder. There are two kinds of rheumatism, the acute, and the chronic, the latter of which is frequently produced by making use of too powerful evacuations during the acute state: but as the acute rheumatism does not require the assistance of these waters, it will be needless to say any thing concerning its treatment, I shall therefore confine myself to the last. By too hasty and copious evacuations during the feverish state of the rheumatism, the viscid part of the blood, instead of being concocted by the fever and expelled the body, is suffered to remain in the cellular membrane, and lateral vessels, which are spread upon the ligaments, and tendinous parts; and upon every cold or change of weather, this lentor is increased, and produces the disagreeable

able pains and stiffness of the joints, which rheumatic people so constantly complain of. This disease was known to the antient *Greek* and *Arabian* Physicians, but better described by the moderns; for this plain reason, their climates were warmer than ours, and consequently not so apt to produce the disease. Obstructed perspiration is the frequent cause of this disease; and whatever does gently open the pores of the skin, must be expected to contribute to the cure: hence we plainly see in what manner warm bathing produces such remarkable good effects. In the chronic Rheumatism, the whole mass of blood is observed to be fizy and thick, but not so membranous and glutinous, as the *Pituita Inflammatoria* in pleuritic patients, nor so soft and yielding, as what the antients called *Pituita Mucosa*, which is observable in the blood of rickety children. As I am desirous of introducing as little Theory as possible in this short performance, I shall not attempt to explain the particular manner in which these waters attenuate this lentor. I shall, therefore, only take notice of it as a fact supported by experience, which must be allowed to be the strongest evidence.

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It is observable, that those who go to *Buxton* on account of rheumatic complaints, find their pains increase after bathing and drinking the waters for a few days, and perceive an universal uneasiness all over their bodies ; but this is no unpromising sign, as it only denotes that the impacted matter is attenuated, and again absorbed into the circulation, which before was obstructed in the small vessels running between the fibres of the muscles, and upon their aponeurotic expansions. They ought therefore to persist in bathing and drinking, taking care to avoid cold, which might prove of very bad consequence, and endanger a fresh attack of an acute rheumatic fever. If any particular joint be more affected than the rest, it ought to be well pumped, and rubbed with a flesh-brush, in order to attenuate the impacted matter ; but if still the joint should remain rigid, it would be advisable to rub it frequently with some saponaceous penetrating application, such as the *Linimentum Saponaceum* ; at the same time a decoction of guaicum and sarsaparilla, with a few drops of any volatile alkaline spirit, may be used with freedom. If after this the joint should still remain rigid, it would not be amiss to bathe it in water made

made warm by an artificial heat, and poured upon the limb from a tea-kettle. These methods generally succeed when managed with prudence, according to the symptoms of the disease. After the patient has got quit of all his complaints, and the muscles and joints are become free and moveable, he should be advised to bathe for a week or ten days in the sea, or any cold spring, in order to brace up the weakened vessels, without which there is no security against a relapse.

There is a remedy which I have heard much recommended for the cure of the rheumatic pains, and that is the Electrical shock. I must confess, I have never been an eye-witness of the cures performed by this operation, but as I have an account of them from undoubted authority, I am persuaded they are true. The *modus operandi* of Electricity has not hitherto been fully explained, but if we dare to form any judgment of it from its effects, we must suppose it to be one of the most rapid and penetrating things in nature. Experiments teach us, that the texture of metals may be dissolved by its impulse, and how much more readily must the viscid rheumatic matter be agitated and attenuated? A spring and oscillation is at
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the same time given to the obstructed vessels, by which means they more readily endeavour to free themselves from the impacted load, and send it back again into the common course of the circulation. I wish those gentlemen who delight in electrical experiments, would employ their thoughts towards making electricity as useful as amusing. I dare venture to assure those who are not of the faculty, that they may proceed with great safety in making experiments upon rheumatic patients, and if they should be so happy as to succeed in any of them, I am sure the public will acknowledge the obligation.

There is one thing which rheumatic people should always religiously observe, and that is, to keep the pores of the skin sufficiently open; for which intention, there is nothing better than the frequent use of the flesh-brush. I have known many rheumatic people receive great benefit from wearing a flannel shirt next their skins, which we know from reason and experience is a powerful promoter of insensible perspiration. I would also advise those who are afflicted with sciatic pains, never to have their breeches lined with leather, as it discourages perspiration by its natural dampness, they should therefore
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make use of soft flannel. This I have known practised in many cases with great success.

These waters are serviceable in the scorbutic Rheumatism, a disease which commonly attacks women, and men of a weakly constitution. It differs from the genuine Rheumatism, in being more irregular in its attacks, and seldom or never attended with any degree of fever, and rarely occasions any swelling.

Now it afflicts a particular member, and in a little time it seizes the inward parts and occasions sickness, which goes off again when the pain returns to the outward parts; and in this manner it continues to afflict the patient by turns. This is the account the sagacious *Sydenham* gives of the disease; and he makes an observation, that those who have long used the peruvian bark, are most subject to its attacks. As it appeared in many symptoms similar to the scurvy, he found it yield to antiscorbutic remedies after bleeding, purging, and a milk diet had been prescribed without effect. During my short stay at *Buxton*, I had the pleasure of seeing several patients in this complaint receive great benefit

benefit from drinking the waters and bathing.

It is usual for the Gout, after a severe attack, to leave a great weakness upon the afflicted joint, which if not properly braced up after the pain is gone off, is sometimes attended with inconvenience. The Baths in *Somersetshire* do not seem well calculated for this intention, on account of their too relaxing quality. *Buxton* Bath is always found to answer in these sort of cases, which may very reasonably be expected, as they have a sufficient degree of coldness to brace up the relaxed fibres, and if any gelatinous matter has settled under the vaginae of the tendons or upon the ligaments, which is very common, it may be attenuated by remaining in the Bath a longer time; and thus according to the nature of the case, the patient may gradually shorten the time of bathing, until he arrive at a single immersion.

From what I have observed above, it will be needless for people to repair here, who have any great rigidity in their joints, whether from a contraction of the tendons or ligaments, a concretion of the mucilaginous juices of the joint, or from any other cause.

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The warmest and most relaxing Baths are in these cases to be sought after, such as those in *Somersetshire*; but if so long a journey be inconvenient, I believe the patient may with nearly the same advantage make use of a Bath of warm spring-water in his own house. But as the pump cannot be made use of there, it may be adviseable to pour the warm water upon the afflicted member from a tea-kettle. If this method should prove ineffectual to relax the contracted ligaments, we must then advise the member to be held over the steams of boiling water, which is one of the most powerful methods of softening animal substances. Frictions with the softest oils, and gentle motion must not be neglected. I would not be understood to condemn these waters in slight contractions of the joints, especially from a rheumatic cause, I only say, that when the rigidity is very great and of long continuance, that more relaxing waters must be preferred to *Buxton*. After the above manner, I have observed many rigid members restored to a great degree of mobility, after they had resisted the usual emollient applications.

Buxton waters are in great repute on account of their success in Paralytic disorders. But I am afraid Physicians do not attend sufficiently
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to the nature of the palsy; for without ever considering the cause of the disease, they are apt to recommend the frequent use of the cold Bath as the only means of recovery. I believe it may be generally said, that the hot Baths are better adapted to the cure of this disease, though in many cases the cold may be preferable to the hot. However this necessary distinction is seldom made, as most people are fond of repairing to the same place where their friends have received relief in the like complaints, not considering that though the disease be the same, yet it may proceed from opposite causes, and consequently must require a different treatment. This practical error, as well as a great many others, is owing to an imperfect knowledge of the physiology, which prevents Physicians from distinguishing the remote and proximate causes of diseases, so that they are obliged to prescribe to the name only; a practice as common as erroneous. Dr *Mead* observes, that paralytic patients are often seized with fits of an apoplexy immediately upon coming out of the warm Bath, which indeed may be readily accounted for. For if the palsy be of that kind, called a paraplegia or hemiplegia, both which are commonly the crisis of an apoplexy, there is reason to apprehend a return of the original disease

ease from the rarefying power of the water, and more especially if the patient be of a plethoric habit. I cannot be brought to think, that the celebrated author above mentioned did absolutely mean to condemn warm bathing in every species of the palsy, though I must confess, that what he says in his *Monita et Precepta Medica* will bear no other interpretation, than that warm bathing is hurtful to all paralytics. His words are, *Immersiones calidæ paralyticis omnibus nocent.* Lest the severity of this sentence, pronounced by so great a man against Bathwaters, might have too powerful an influence over many paralytic patients, Dr *Summers* thought it necessary to produce the register of the general Infirmary at *Bath*, wherein he makes it appear, that a great number of patients labouring under every kind of the palsy had received relief from the warm Baths. For my part, I believe much may be said on both sides, but as this short performance will not admit of discussing this point in its full extent, I shall therefore leave it to be determined by better judges, and content myself with enumerating a few causes from whence the different palsies may proceed, and leave the intelligent reader to his own judgment in the choice of the hot, temperate, or cold Baths.

I believe I may venture to say, that most palsies proceed either from a retention of the natural perspiration, or from some morbid or critical matter falling upon the brain, *medulla spinalis*, or vaginal coat of the nerves, instead of being regularly expelled through some of the emunctories; which last kind of cases are frequently found to succeed acute diseases, as *Van Swieten* in his Commentary observes. The ill effects of retained perspiration we may learn from *Hippocrates*, who says, that during a continued moisture of the air, with a northerly wind, paraplegias were almost epidemical; and *Sanctorius*, in his 67th *Aphorism*, explains the above observation, when he tells us, that the natural perspiration flies off faster in cold dry weather, than when the air is cold and moist.

Daily observation informs us, that palsies are often produced by lying in damp beds or upon the ground exposed to a moist air; and in such cases it is apparent, that a retention of the perspirable matter is the cause of the disease. Our indication of cure must be by all possible means to open the pores of the skin by warm bathing and sudorific
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remedies. What could be expected from cold bathing in such cases?

It sometimes happens that palsies proceed from an absolute relaxation of the muscular parts, without any previous obstruction in the brain, nerves, or blood vessels, and this kind of palsy is generally hereditary, and attacks the patient by slow degrees, and for the most part is partial either to the upper or lower extremities. In such cases, warm bathing would be certain destruction, while on the contrary, the cold Bath is plainly indicated.

The Gout is sometimes observed to throw a little of the critical matter upon the brain or medulla oblongata, and sometimes upon the vaginæ of the nerves, at some distance from their origin. In such cases it may be a judicious practice to prescribe the hot Baths in *Somersetshire*, or those made so by an artificial heat, with an intention to attenuate the gouty matter, and to solicit its expulsion upon the extremities. The same may be practised when the disease proceeds from any tumor, or enlarged glands pressing upon the nerve in its passage to any particular part. Schirrous glands of the axilla, are frequently observed to occasion a palsy of

the affected arm, which must be cured by applications of an emollient and saponaceous nature to the glands themselves, but if that method should not succeed, we must then proceed to extirpation of them by the knife.

Whatever does prevent the influx of the arterial blood into any particular part, will assuredly produce a Palsy of that part, and this is often exemplified in the operation for the true aneurism in the arm; before the wound has been healed I have observed a numbness of the arm, and sometimes a temporary Palsy of the fingers, which goes off as soon as the lateral vessels, above the ligature, are sufficiently enlarged to admit the free circulation of the blood to the muscular parts. Some people may imagine this temporary Palsy proceeds from some of the nervous filaments being cut, or taken up by the ligature; perhaps it may, but as it goes off as soon as the lateral vessels are sufficiently enlarged, I am more inclinable to impute it to an obstruction of the circulation, than to any other cause. For if you make the experiment upon a dog, and tie a blood-vessel of any consequence, you will produce a Palsy of the muscles, which are supplied by its branches, in the same manner

manner as if you had made the ligature round the nerve in its progress to the same place.

When the wonted evacuation of the piles has been stopped, the viscid blood, instead of being regularly thrown upon the hæmorrhoidal veins, does sometimes fall upon the origin of the nerves, and produces an Apoplexy, Paraplegia, Hemiplegia, or a Palsy of the upper or lower extremities. The menstrea in like manner, when obstructed, have been known to produce the same diseases; and it is a common observation, that Palsies do often arise from imprudently repelling some eruptions of the skin, as for example, the Itch. In the above cases, it evidently appears that cold bathing would be highly injurious, while on the contrary, warm bathing, by its relaxing property, would prove of the greatest service.

As I have frequently made mention of the word Paraplegia, it may not be amiss to observe, that the ancients did not receive it in the same sense that we do. With us, an inability of motion of all the voluntary muscles below the head, is called a Paraplegia, but by the ancients a Palsy of any of the members of the body was called by that name. Thus *Aretæus*, after observing that

Apoplexies, Paraplegias and Palsies were much of the same nature, says, *Paraplegia autem est Tactus motus motusque remissio, sed in membro uno, utpote manu vel crure. Morbor: diuturn. Lib. I. cap. vii. p. 33. Galen, in his Commentary, has these words, Hippocrates vocat Paraplegias illas Paralytes, quæ ex Apoplexia in partem quandam decumbunt. And Aretæus also, speaking of Hippocrates, says, Quod enim in toto corpore est vehemens Apoplexia, illud in crure Paraplegiam vocat.*

It is a common practice to apply warm stimulating things to paralytic muscles, but these can be of little or no service as the cause lies at the origin of the nerve. Thus if the inferior extremities are affected, all our topical applications must be made to the lower vertebræ; but if the upper extremities are paralytic, then our applications ought to be made as near as possible to the origin of the fifth, sixth and seventh cervical nerves, and first of the dorsal. The whole of this practice is beautifully laid down by *Alexander Trallianus*; his words are, *Si igitur ex superioribus partibus quædam affectæ fuerint, nempe oculus, nasus aut lingua, aut quædam in facie, constat, quod ipsum cerebrum habeat morbum, illique primario succurrendum sit: si ergo nulla ex prædictis partibus sensu aut motu aut utroque læsa*

læsa fuerit, necesse est spinalem medullam laborare, aut aliquem nervorum ex ipsa prodeuntium affectum esse statuere. Attendito igitur diligenter, quæ sit pars affecta, aut unde initium trahat, aut a qua vertebra id aut nervo recipiat, atque illi curationem adhibeto: Non autem, ut vulgo, symptomatibus tantum absistito. Itaque resolutas partes sic internoscere oportet, animum scientiæ anatomicæ adhibendo. Lib. I. cap. xvi. p. 88.

Galen in a very distinct manner makes the same observation, when he says,—Nam crura et manus, temerè et frustra, multi medici tota die nocteque calefacientibus remediis perfri- cant, negligentes locum, ubi vel spinalis medulla, vel nervus aliquis ex ipsa egrediens, læditur. De locis affectis. Lib. IV. cap. 7. Charter. Tom. VII. p. 465.

The temperature of *Buxton Bath* is such, that it may be used either as a hot or cold Bath. Upon first plunging into the water, the patient receives a shock nearly equal to what is felt upon going into river water in the height of summer; but if the nature of the disease requires relaxation, the time of staying in the Bath must be protracted until the relaxing power of the water is observed. This may be justly esteemed among the
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chief properties of *Buxton* Bath, in which it very widely differs both from *Bath* and *Bristol*; for in one the waters are too hot, and in the other too cold to enjoy this advantage. When any obstructed matter has settled upon the vaginæ of the nerves, and occasions a Palsy, or upon the ligaments, &c. so as to bring on rheumatic pains, this sudden shock, from the coldness of the water, and the rarefaction and relaxation that afterwards succeed, will do more in removing it, than any of the hot Baths which are only capable of relaxation and rarefaction. This practice with respect to alternate contraction and relaxation from cold and heat is not of modern date, having been successfully used by the ancient *Greek* and *Arabian* physicians. As soon as we are sensible that the obstructing cause is removed, we must then discontinue the use of the warm Bath, and advise the patient to have recourse to the cold Bath, with an intention to brace up the relaxed muscles. I do not find that the pores of the skin can at any time be so much relaxed by these waters, as to be the means of producing such copious sweats, as are usual after coming out of the Baths in *Somersetshire*. In many cases this may be their great advantage, though I could wish they were more relaxing in others.

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However this inconvenience may be easily remedied at a small expence, if the noble proprietor of *Buxton* would order a small separate Bath to be dug, and so constructed, that it might readily receive a quantity of boiling water, to make its contents of any determinate heat. I am satisfied, that an improvement of this kind in the hands of a judicious physician, might be made to answer most, if not all the external purposes of the waters of *Bath*; for such an additional heat would not only increase their virtues in many diseases for which they are prescribed in their present form, but would also make them an efficacious remedy against others, which cannot possibly receive any benefit from them in their present situation. And here it may not be improper to observe, that the medicinal virtues of the drinking waters may be also increased. At present the well is exposed to the open air, and every time the well-woman fills her glass, the waters are inevitably agitated, and the volatile spirit, instead of being carefully retained, is in some degree dissipated. A Pump might easily remedy this inconvenience, and as the use of such a machine is obvious, and the expence attending it but trifling; it is matter of surprize that the well has remained so long without it.

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Let us now examine in what manner the body is affected by this Bath, and we shall from thence be able to determine in what diseases it ought to be prescribed, and in what it ought to be forbid. The instant the patient plunges into the water, he receives a gentle shock, nearly equal to what is felt upon going into a pond of water in a hot summer's day, but in a few minutes the sensation of coldness goes off, and is succeeded by an agreeable warmth, and if he remains in the Bath long enough, a relaxation of the vessels and muscular parts will ensue. By this shock, the blood is instantaneously drove from all the vessels, which are near the surface of the skin, and of consequence is impelled upon the internal parts, which it continues to load as long as the capillary vessels near the surface of the skin are contracted by the cold. The muscular fibres are made to approximate nearer to one another, and the smallest vessels, as well as the largest, are made to embrace their contents with a sudden spring. The heart labours, by frequent and strong contractions, to propel the sudden torrent of blood which is thrown upon its right auricle and ventricle, and the lungs, through which it must pass, receive it with difficulty. Hence it is obvious, that those who have weak viscera, especially

especially the lungs, should proceed with great caution in using the bath. In a few minutes an agreeable warmth succeeds the former sensation, and the blood which was before impelled upon the heart, lungs and abdominal viscera, is now drove back again towards the surface by the increased action of the heart and arterial system. The blood being now increased in motion, is also increased in volume and momentum, whereby it is enabled to move through some vessels, which before were only pervious to globules of the serous order. The skin and muscular parts being also relaxed, the bibulous veins have an opportunity of drinking up the most elementary parts of the water, and the exhalant arteries, for the same reasons, are encouraged to breathe forth their contents with freedom. At the same time, some part of the water must be supposed to insinuate itself between the fibres of the muscles to serve as a softening fomentation to them, and thereby assist in removing diseases arising from too rigid fibres. After this, if the patient retires to his bed, he may expect to have a gentle sweat, which in many cases it may be very proper to do.

There are few diseases which require bathing above once in twenty four hours,
and

and according to the nature of the case, the time of remaining in the Bath must be shortned or protracted. If it be short, it operates much after the manner of a river Bath in the height of summer, but if the patient chuses to remain in the Bath above four minutes, the relaxing power of the waters will then begin to take place. The morning is the best time for bathing, about an hour before breakfast, though any time of the day may be proper if not too soon after eating. Few people drink above three pints of the water in a day, but if their stomachs can well bear it, and the nature of the case require it, they may safely increase the quantity. The best way of drinking is to begin with a small quantity, and so increase the doses as they are found to agree. The only sensible operation of these waters is by urine, and as it sometimes happens they do not pass off freely, it may be adviseable to take a tea spoonful of sweet spirit of nitre in a glass of water, and afterwards take the air on horseback, or in any other manner, so as to shake the abdominal viscera, which method seldom or never fails of success.

Half a pint before breakfast, about two half pints between that and dinner, and
three

three half pints between dinner and supper, make up the quantity generally taken by those who are the largest drinkers. But as it is impossible to lay down rules which can be absolute, either with respect to the bathing or drinking waters, the patient would do well to consult his physician before he begins their use. It is a very good method to drink the waters for a few days before bathing, and as they are apt to occasion costiveness, it would not be amiss to use a little lenitive electuary, or any other suitable laxative to prevent this inconvenience.

There is one thing I do most earnestly recommend, and that is, not to indulge the appetite which these waters give, for though the stomach be sufficiently strong to receive its contents, and the chylopoietic and sanguifying organs able to assimilate them into good blood, yet there is reason to fear that a fulness too suddenly induced may prove of dangerous consequence. *Semel multum et repente vel evacuare vel replere periculosum.*
HIPPOCR.

It is usual at *Buxton* for every body to indulge very freely with butter in a morning at breakfast, but I would advise them
to

to be more moderate in that article, as it is apt to grow rancid upon weak stomachs, and may prevent the good effect of the waters upon that organ, a thing much to be attended to.

The usual season for drinking these waters, is from the beginning of *May*, to the latter end of *October*; but if the patient requires a longer perseverance, he may safely use them all the winter, as they are found upon repeated trials to be equally good in all seasons.

I shall now conclude this short account of *Buxton* waters with observing, that there, as well as in most other places of public resort, much of the patient's recovery depends upon the change of air, diet and company, and on that account every one ought to make these necessary assistants contribute as much to his advantage as possible.

F I N I S.





A
TREATISE

O N

*Tobacco, Tea, Coffee, and
Chocolate.*



